





Vol. V

C625.662085
B75
MHT

JANUARY, 1911

No. 1

BRILL MAGAZINE



Calle Pedro Mendoza
Buenos Aires, Argentina.

Repro. permission of The Phila. Museums.



BRILL "WINNER" SEAT

This seat has a one-piece pressed steel pedestal and pressed steel aisle and wall plates. It is the lightest seat made, and the method of constructing the pedestal and use of angle iron crossings make it the strongest seat on the market. The seat is upholstered in woven cane of Brill manufacture, or in plush, leather or imitation leather. Backs are made any height, plain or three-part.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



Arthur W. Gaddy

PRESIDENT, AMERICAN ELECTRIC RAILWAY ASSOCIATION
PRESIDENT, INDIANA UNION TRACTION COMPANY

BRILL MAGAZINE

Vol. V

JANUARY, 1911

No. 1

ARTHUR W. BRADY

[WITH PORTRAIT INSERT]

A RTHUR W. BRADY, president of the Indiana Union Traction Company and of the American Street Railway Association, was born at Muncie, Ind., in 1865. He was educated in the Muncie public schools, at Upson Seminary, New Preston, Conn., at Yale University, and was graduated from the law department of the University of Michigan in the class of 1889. He then engaged in the practice of law at Muncie, of which city he was mayor from 1891 to 1894. While at Muncie he was counsel of the Citizens' Street Railway Company, afterwards a part of the Union Traction Company of Indiana, and the Muncie, Hartford & Fort Wayne Railway Company, which built the interurban line from Muncie to Bluffton. In 1902 he became director, secretary and counsel of the Indianapolis Northern Traction Company, which built the interurban line from Indianapolis to Kokomo, Peru and Logansport, now a part of the Indiana Union Traction Company's system. In 1903, the Indiana Union Traction Company was organized, and he became vice-president. In 1904 he was elected president. Since 1904 his residence has been in Anderson, Ind., where the general offices of the company are located. His first official connection with the American Street Railway Association was in 1906, when he became third vice-president. In 1907 he was elected second vice-president; in 1909, first vice-president; and in 1910, at the Atlantic City convention, he was elected president.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

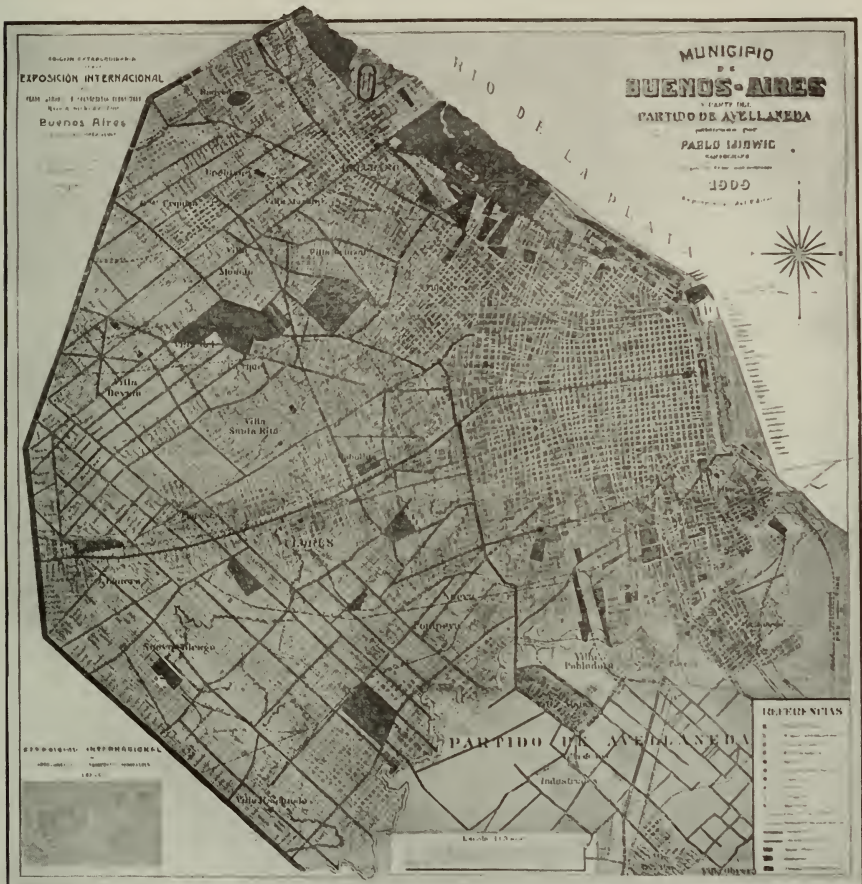
BUENOS AIRES, ARGENTINA*

BUENOS AIRES, the capital of Argentina, is situated on the eastern coast on the La Plate River. In area and population the city ranks among the largest capitals and seaports of the world, extending 11 miles north and south, $15\frac{1}{2}$ miles east and west, and having a circumference of 38 miles. Owing to the shallow and shifting character of the channel of the La Plate River, it was necessary to construct an elaborate and expensive system of harbors, so that Buenos Aires is a self-created rather than a natural seaport. The climate is temperate, moist and equable, and the seasons alternate reversely with those of the north temperate zone, spring commencing in September and autumn in March.

The city is laid out in chess-board fashion, the streets intersecting at right angles, and a splendid system of boulevards radiating from the center of the city and extending through the surrounding suburbs to the municipal limits. The business section is located in the northeastern part of the city, and the finer residential district along the Avenida de Mayo and its intersecting streets and extending into the numerous and rapidly-growing suburbs. The Avenida de Mayo is one of the finest and most celebrated avenues in the world, extending for $1\frac{1}{2}$ miles and bordered by a succession of magnificent public buildings, offices, private residences and cafés.

Several separate companies give Buenos Aires excellent tramway service. From January 1st to September 30th, 1909, these lines carried over 205,000,000 passengers. This, compared with 185,500,000 carried during the same period of the preceding year, gives some idea of the rapid growth of the

* The twenty-fifth article of this series.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Buenos Aires has doubled its population in the last decade and has now 1,250,000. The dark lines in the map indicate avenues. The tramway systems are not shown. Several separate companies provide excellent transportation service

city. The Anglo-Argentine Company carried 143,000,000 passengers, running 21,850 car miles. This company contemplates the construction of a system of subways.

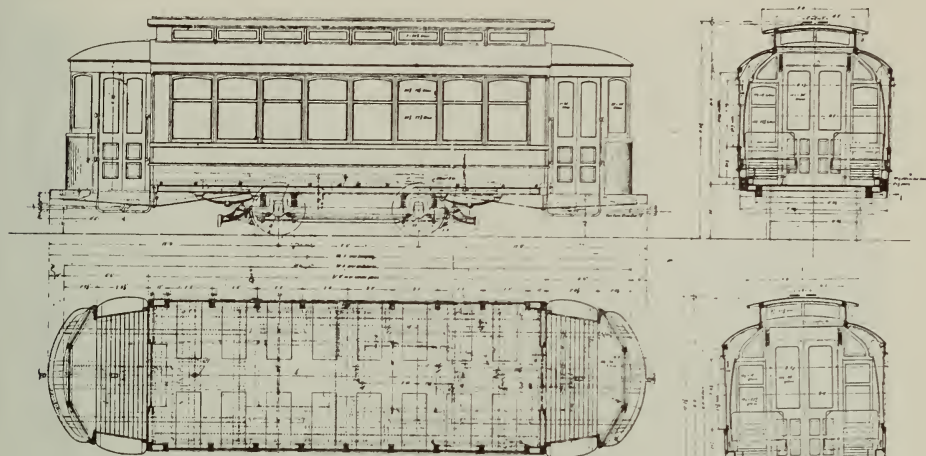
The Capital Tramways Company and the Buenos Aires and Bel Grano Company have a number of Brill cars and the Buenos Aires Port & City Tramways are now operating Brill No. 27-GE trucks under a number of their cars. The Cia de Tramways Electricos de Sud will shortly receive a shipment of Brill trucks of the No. 27-GE2 type.

The Lacroze Tramways Company of Buenos Aires have thirty-seven 30-ft. 8-in. Brill semi-convertible cars and two hundred and twenty-two 21-ft. 4-in. cars of the same type. The smaller cars, for city service, are mounted on Brill No. 21-E trucks, and the larger cars, operating on both city and suburban lines, with Brill No. 27-E1 trucks. The temperate and equable climate renders the semi-convertible type of car most suitable to the requirements of the service.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Calle Corriente, traversed by the lines of the Buenos Aires Lacroze Tramways

Both types of cars are handsomely finished in mahogany and furnished with the Brill "Winner" type of seats, upholstered in cane. These seats are large and comfortable, and have arm rests on the window sills, as the sills are unusually low in this type of car. The windows of the larger cars are of the twin arched-top type, with opalescent glass in the upper and in the ventilator sashes. This opalescent glass subdues the light with pleasant effect and makes it unnecessary to draw the

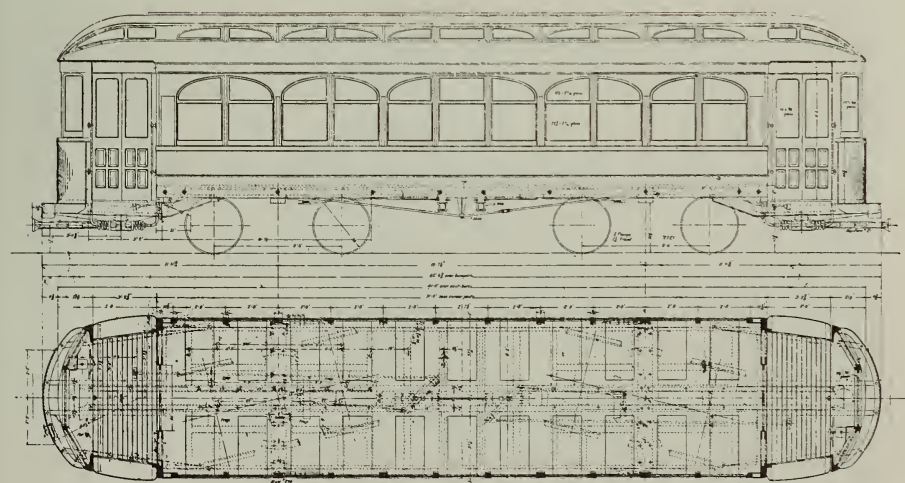


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The standard single-truck car of the Lacroze System. Brill semi-convertible type. Length of body, 21 ft. 4 in.; length over vestibules, 30 ft 4 in. Mounted on Brill No. 21-E truck

The lower cross-section relates to the double-truck car

shades during the larger part of the day.

The ceilings are full empire. During warm weather, the windows are raised in roof pockets, leaving the window spaces clear of sashes and converting the car into practically an open summer car, admirably adapted to the local climatic conditions. The



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The standard double-truck car of the Lacroze System. Brill semi-convertible type. Length of body, 31 ft.; length over vestibules, 41 ft. Mounted on Brill No. 27-E trucks



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Procession in connection with religious ceremonies at the opening of the Argentina Centenary Exposition. Dr. José Figueroa Alcorta, the former President of Argentina, is indicated by the arrow. Dr. Alcorta was succeeded in October, 1910, by Dr. Roque Sáenz Peña. The buildings face the Plaza de Mayo

Brill No. 27-E1 trucks under these cars are suitable for high speeds permitted on the suburban portions of the system.

The first section of the electric lines was laid in 1897, and since that time the municipality found it necessary to construct a vast system of diagonal avenues and widen the streets, on account of the rapidly increasing congestion.

Of the various tramway systems of Buenos Aires, the Lacroze Tramway Company is one of the most interesting, as it is the only native Argentine tramway in the city and the first to have a high-speed interurban service, on the American plan, with cars equipped for a maximum speed of 50 miles per hour and its own private right of way. Mr. Federico Lacroze, one of the pioneers of tramway traction in Buenos Aires, formed the Tramway Rural in 1884. The first line which he built ran from the Plaza de Mayo to the Plaza 11 de Setiembre, which line he sold later to the Anglo-Argentine Company and which was the beginning of the extensive system now operated

by that company. Mr. Lacroze, with characteristic activity, extended his system into the system of tramways until recently operating under the name of the "Rural Tramways," and furthermore, extended his lines into the country, at a time when other companies failed to realize the importance of possessing adequate suburban communication.

Owing to the rapid growth of the undertaking, it finally became necessary to form two different systems, viz., The City Tramway Lines, now known as the "Buenos Aires Lacroze Tramways," and a steam railway line, extending from Chacarita station in Buenos Aires to Salto and Zarate, the total length being 137 miles. This line was known as the "Tramway Rural á Vapor," but was afterward organized into a new company called "Ferro Carril Central de Buenos Aires Limitada." A point of interest in connection with the original



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Entrance to the Argentina Centenary Exposition

franchise is that the same was granted to the concessionaire under the obligation of the exclusive use of horse traction, the reason given by the authorities being that it was necessary to develop the national industry of the country, which at that time depended almost entirely upon horse breeding.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The exhibit of the J. G. Brill Company, in the transportation section of the Exposition, included the Brill semi-convertible car mounted on Brill No. 27-E trucks, shown in the engraving, and a shorter car of same type mounted on Brill single truck No. 21-E. Awarded Grand Prix

Under the old concession the original tramway was gradually extended for a distance of about 100 miles into the country, and holds the record for long distance tramway service by horse traction and having been the only horse tramway to run a sleeping car over its lines. This car was designed and built by The J. G. Brill Company. At a later date the authorities recognized that it was necessary to permit the use

of mechanical traction in order to obtain efficient service, and for this purpose steam locomotives were employed.

The development of the business of the Tramway Rural in the hands of Federico Lacroze became, at his death, still more important in those of his energetic sons. In 1905 they



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Dining car, first-class passenger car, second-class passenger car and combination baggage and mail car exhibited by the Wason Manufacturing Company. Mounted on Brill No. 27-E3 Trucks. Awarded Grand Prix

entered into a contract with J. G. White & Co. of London for the reconstruction and electrification of the old city lines, under the name of the "Buenos Aires Lacroze Tramways". Being laid in the new portion of the city, the streets were wide enough to admit of a double track.

In March, 1906, the work was begun and before the end of that year the new power-house, with a capacity of 2,250 kilo-

watts, was in running order, an achievement which, in consideration of the labor troubles and port congestion at that time, was phenomenal. On the 10th of March, 1907, part of the lines were formally opened to public traffic, and since that time traffic receipts have been steadily increasing. The original line consisted of some 24 miles of track owned by the company and six miles held jointly with other companies and on lease.

The J. G. Brill Company has furnished all the cars and trucks to the city and steam railways of the Lacroze system since the beginning of its history, and the adoption of the Brill semi-convertible type has given great satisfaction to the patrons of the lines.

Brill equipment is not, however, confined to the electric roads, for nearly every railway in that section of the country uses Brill trucks more or less, and the Ferro Carril Central de Buenos Aires has thirty passenger cars and trucks, besides over 200 cattle, gondola, baggage cars, etc., all built by The J. G. Brill Company.

The Wason Manufacturing Company has also furnished a large number of cars for the steam lines of Argentina, and has recently built a train of four cars for the Ferro Carril Central de Buenos Aires, the same being exhibited at the Argentine Centenary Exposition held at Buenos Aires during the past year and mounted on Brill No. 27-E3 trucks.

The train consisted of a dining car, a first-class passenger car, a second-class passenger car and a combination baggage and mail car. The exhibit was one of the most attractive in the transportation section of the Exposition and occupied an area of 1900 square feet. In addition, two new cars for the Lacroze system were shown, one a 30-ft. 8-in. vestibuled Brill semi-convertible car mounted on Brill No. 27-E1 trucks, and the other a 21-ft. 4 $\frac{1}{4}$ -in. vestibuled Brill semi-convertible car mounted on Brill No. 21-E truck. The Grand Prix was

awarded to The J. G. Brill Company and the Wason Manufacturing Company for superiority in electric and steam car and truck design and construction.

The Exposition was held to celebrate the 100th anniversary of the birth of the Republic. Its marvelous growth, especially in its pastoral industries and its railroads, which center at Buenos Aires, was splendidly shown in the exhibits and attracted people from all quarters of the globe. It has opened the eyes of the nations to the phenomenal development of the country within a short period. From 1880 to 1884 the annual imports amounted to \$67,500,000 and the exports to \$61,000,000. In 1909 the imports amounted to \$302,750,000 and the exports \$400,000,000. The first railway was built in 1854, and to-day the mileage of steam railways is 16,950, and 7,400 additional are under construction. The number of passengers carried in 1909 on steam roads approximated 50,000,000, with 32,000,000 tons of freight.



INTERESTING INTERURBAN CARS FOR THE CHICAGO & JOLIET RAILWAY

BRILL PLAIN ARCH ROOF

ONE of the large companies to adopt the plain arch roof for its cars is the American Railways Company, of Philadelphia, which recently received twelve for one of its systems, the Chicago & Joliet Electric Railway. Two of these cars were built by the J. G. Brill Company and are for interurban service between Chicago and Joliet, and the balance were built by the G. C. Kuhlman Car Company and are single-truck cars for the city lines in Joliet. The city

cars are similar to those built for the Peoples Railway of Dayton, Ohio, described on page 294 of the October, 1910, issue of the BRILL MAGAZINE. The Chicago & Joliet Electric Railway controls and operates the lines in Joliet, and reaches Chicago through the Chicago & Desplaines Valley road, which it also controls, and through a branch line from Summit to Lyons, where connection is made with the Chicago Railways Company. Dellwood Park, a part of the railway property, was described in the January, 1907, issue of the BRILL MAGAZINE.

The two cars recently received by this company from The J. G. Brill Company are among the first strictly interurban cars to have the plain arch roof. Heretofore the tendency has been to adhere as close to the steam passenger coach as possible, so the Brill roof car, with its increased window space and lighter weight body construction, is almost a radical departure. The result appears to be well worth the change, as the appearance is excellent, and the advantages are increased head room, higher windows, stronger roof construction, lighter in weight, and absolutely waterproof. The Chicago & Joliet cars are equipped with the Vacuum Car Ventilating Company's ventilators, described in the October, 1910, issue of the BRILL MAGAZINE.



INTERESTING INTERURBAN CARS FOR THE CHICAGO & JOLIET RAILWAY. One of the first lots of interurban cars to have the Brill Plain Arch Roof. The smoking compartment occupies the space of five windows. In the engraving the location of the toilet room is obscured by the chipped glass in the lower sash. The cars have all-steel underframes and are mounted on Brill No. 27-M.C.B.2 Trucks

The cars are divided into two sections: a smoking compartment 14 ft. long, seating 20 passengers, and a passenger compartment 22 ft. long, with seats for thirty and a saloon against the partition. The seats are placed transversely, with the exception of four longitudinal corner seats. The upper window sashes are stationary and the lower raise. The plain arch roof enables the windows to be



INTERESTING INTERURBAN CARS FOR THE CHICAGO & JOLIET RAILWAY
The casings of the motor-driven exhaust fan and ducts are shown under the platform hood, and the outlet is seen on the edge of the roof. The vestibules are provided with both doors and gates

about five inches higher than with the monitor type of roof. The lights are placed in two rows directly over the center of the seats, one light to each seat. Basket racks of a neat design are placed over every alternate window. The bronze trim throughout is attractive in design and of substantial character. The underframe is of all-steel construction and consists of 8-in. Z bar side sills, 10-in. channel end sills and 5-in. channel crossings. The ends of the cars are protected with Brill patented angle iron buffers.

The cars are mounted on Brill No. 27-M.C.B.2 trucks. The trucks have a wheel base of 6 ft. 3 in., and 34-in. rolled steel wheels. The bolster centers are spaced 24 ft. apart and



INTERESTING INTERURBAN CARS FOR THE CHICAGO & JOLIET RAILWAY. The photograph convincingly proves that the omission of deck sashes does not lessen the brightness and attractiveness of the interior. The smoking compartment seats 20 passengers and the other compartment 30

the trucks are arranged to permit of negotiating curves of 35 ft. radius. The cars are equipped with air couplings for train service, these couplings being attached to the draw head.

Length of body	36 ft.	From step to platform . . .	15 in.
Length over platforms . . .	46 ft.	From platform to car floor .	7¼ in.
Length of platforms	5 ft.	Seating capacity	50
Length of smoking compart.	14 ft.	Type of trucks . . . 27-M.C.B.2	—4-65 h.p.
Centers of side posts	2 ft. 8 in.	Type of motors	GE 210
Width over sills	8 ft. 7 in.	Wt. of car less elec. equip.	25,294 lbs.
Width over posts	8 ft. 7 in.	Wt. of electrical equip. . .	2,556 lbs.
Extreme width	8 ft. 10¼ in.	Wt. of air brake equip. . .	1,800 lbs.
From track to sills	2 ft. 8⅞ in.	Wt. of trucks	18,000 lbs.
From sills over trolley boards	9 ft. ½ in.	Wt. of motors	13,200 lbs.
From floor to headlining . .	7 ft. 7⅞ in.	Total weight	60,850 lbs.
From track to step	17⅞ in.		

OPEN AND CLOSED CARS FOR ATHENS, GEORGIA

BRILL No. 39-E TRUCKS

SINGLE-MOTOR trucks are being adopted in many cities as standard, and under all but exceptional conditions a two-motor equipment is sufficient for a city car. One of the latest lines to adopt this type of truck is the Athens Electric Railway Company, which recently received from the American Car Company six cars mounted on Brill No. 39-E trucks. The cars were of two types: Three 34-ft. $\frac{3}{8}$ -in. 12-bench open "Narragansett" type and three semi-convertible. The "Narragansett" open cars have a seating capacity of 60 and, besides being a necessary addition for regular traffic, will aid much in the heavy excursion service during the summer months. The side sills are 8 x 3 x $\frac{1}{2}$ -in. Z bars. In constructing the car the lower angle of the Z bar extends outward, the posts and the body construction resting on the upper angle. The extending part of the sill is fitted with step treads between each pair of posts, making an 8-inch step down from



OPEN AND CLOSED CARS FOR ATHENS, GEORGIA. Stephenson semi-convertible type of car with 25-ft. 4-in. body. Mounted on Brill No. 39-E Trucks



OPEN AND CLOSED CARS FOR ATHENS, GEORGIA. The Stephenson semi-convertible window system consists of a lower sash which drops into a wall pocket and an upper sash which raises into a recess behind the letter panel

the floor of the car and therefore reducing the height of the running board. This result is obtained with no addition to the width of the car, as the upper step is inside the outer width of the car body.

The semi-convertible cars are for all-the-year-round service. During the cold months they alone are used, but in the summer the service is augmented by the use of the open and by trail cars. The Stephenson differs from the Brill semi-convertible window system in that, instead of both sashes raising into roof pockets, only the upper sash raises, while the lower drops into wall pockets. The cars have the monitor type roof and straight sides. The vestibules are round end stationary, with Brill automatic doors at entrances at both sides. The underframing is wood, with side sills reinforced with $\frac{3}{8}$ x12-in. steel plates.

The principal dimensions of the closed cars are as follows:

Length of body	25 ft. 4 in.	From step to platform . .	13 $\frac{9}{16}$ in.
Length over platforms . .	34 ft. 9 in.	From platform to car floor .	9 $\frac{1}{2}$ in.
Length of platforms	4 ft. 8 in.	Seating capacity	32
Centers of side posts . . .	2 ft. 8 in.	Type of trucks	39-E
Width over sills	8 ft.	Type of motors	GE 219—2-50 h.p.
Width over posts	8 ft.	Wt. of car less elec. equip. .	14,000 lbs.
Extreme width	8 ft. 6 in.	Wt. of electrical equipment .	1,570 lbs.
From track to sills	31 $\frac{13}{16}$ in.	Wt. air brake equipment . .	1,500 lbs.
From sills over trolley board	9 ft. 7 in.	Wt. of trucks	9,600 lbs.
From floor to headlining . .	8 ft. 4 $\frac{3}{8}$ in.	Wt. of motors	5,750 lbs.
From track to step	16 $\frac{1}{2}$ in.	Total weight	32,420 lbs.



BAGGAGE CAR FOR THE WASHINGTON RAILWAY & ELECTRIC COMPANY

POWER CRANE EQUIPMENT

EACH year brings an increase in the number of baggage and express cars placed in service on the different electric railways, and especially is this true of the suburban and interurban lines. This class of service is rapidly becoming a valuable source of income and is undoubtedly destined to become an important branch of railway business.

The car shown was recently delivered to the Washington Railway & Electric Company by The J. G. Brill Company and is used in the transportation of baggage, freight and provisions to the suburban parts of Washington. The roof is of the Brill plain arch type and is supported by seven 4 $\frac{1}{2}$ x $\frac{5}{8}$ -in. steel rafters, forged to the shape of the roof in a solid piece and with a foot by which they are securely bolted



BAGGAGE CAR FOR THE WASHINGTON RAILWAY & ELECTRIC COMPANY. An excellent design of car for general freight service. Single swing doors at diagonally opposite corners and wide sliding doors at the center. Photographed on temporary trucks

to the top plate, and by the usual wooden rafters. In the other two corners, as well as in the upper part of the doors, the window sashes are arranged to lower or raise. On each side of the car is a single sliding door with 5-ft. opening and two windows. The upper part of these doors is fitted with three stationary window sashes. All the side windows and door lights are guarded with wrought-iron bars.

To facilitate the loading and unloading of heavy materials, a compressed air hoist, with swinging crane and pulleys, capable of lifting a weight of 800 pounds, is placed at diagonally opposite ends of the center sliding doors. The crane is built of 4-in. channel steel and inside the channel is placed the air cylinder, which is 4 inches in diameter and has a 30-in. piston.

The interior of the car is sheathed with ash to the roof. The floor has fireproof sections over the motors. The side sills are reinforced with $\frac{5}{8}$ x 7-in. steel plates the full length of the sills. Under-trusses and double-trussed needle beams reinforce the underframe, and throughout the construction is of an extra substantial character. The car is equipped with Brill patented angle iron buffers, Dumpit sanders, and Dedenda gongs. There are single swinging doors at diagon-



BAGGAGE CAR FOR THE WASHINGTON RAILWAY & ELECTRIC COMPANY. Compressed air cranes arranged to swing out at the side doors are a part of the equipment, and their location is indicated by the brackets at the center of the car

ally opposite corners of the car to admit long pieces of material and enable the motorman to get at switches quickly.

A removable partition composed of iron piping is provided at both ends to pile freight against and leave necessary space for the motorman. The car is well lighted from two windows on each side, the triple windows in the sliding doors and from the end windows. At night there is ample illumination from three clusters placed along the center of the roof.

Length of body	35	Weight of car less electrical	
Centers of side posts	20 in.	equipment	14,060 lbs.
Width over sills	8 ft. 2 in.	Weight of electrical equip-	
Width over posts	8 ft. 2 in.	ment	1,350 lbs.
Extreme width	8 ft. 5½ in.	Weight of air brake equip-	
From track to sills	2 ft. 7¼ in.	ment	1,500 lbs.
From sills over trolley boards	8 ft. 8⅞ in.	Total weight	16,910 lbs.
From floor to center rafters	7 ft. 7 in.		

SEMI-CONVERTIBLE CARS FOR THE CLINTON STREET RAILWAY

SINGLE ENTRANCE PLATFORMS

CLINTON, with a population of about 25,000 and located on the western side of the upper Mississippi River, is one of the most important cities of eastern Iowa. The city lines, consisting of about 14 miles of track and reaching Lyons, a small town just north of Clinton, are operated and owned by the Clinton Street Railway Company. To the south Clinton is connected with Davenport and intermediate towns by the lines of the Iowa & Illinois Railway Company, an interurban line owning and operating about 40 miles of track. The Clinton Street Railway Company owns one and reaches two other parks. Instead of providing large cars, this company uses a single-truck car with closed vestibules and runs them on a close schedule during rush periods, together with trail cars.



SEMI-CONVERTIBLE CARS FOR THE CLINTON STREET RAILWAY. Double-end 26-ft. 8-in. car with 5-ft. single entrance platforms. Mounted on Brill No. 21-E Truck



SEMI-CONVERTIBLE CARS FOR THE CLINTON STREET RAILWAY. A typical single-track semi-convertible car interior, seating 32 passengers. Note the wide aisle obtainable in this type of car

Cars of the type illustrated were recently built by the American Car Company. They are a little wider than the ordinary type city car and have the semi-convertible window system, which, besides obviating the necessity for two types of equipment, adds materially to the interior width of the car. There are eight 36-in. transverse seats on each side of the aisle, which has a width of 28 inches. This gives a seating capacity of 32 in a 20-ft. 8-in. car and allows plenty of aisle room for standing passengers. The exit and entrance are on diagonally opposite corners of the car, which is built for double-end service and single track lines. The opposite side of the vestibules is enclosed with steel sheathing.

The underframing is of wood, the side sills reinforced with 6 x 3 1/2-in steel angles. The ends of the cars are protected by

Brill patent angle buffers, which are fitted with sloping shields. The cars were mounted on Brill No. 21-E Trucks which the company had on hand.

Length of body	20 ft. 8 in.	From step to platform	13 in.
Length over platforms	30 ft. 8 in.	From platform to car floor	6 $\frac{1}{2}$ in.
Length of platforms	5 ft.	Seating capacity	32
Centers of side posts	29 in.	Type of trucks	Brill 21-E
Width over sills	8 ft. 5 $\frac{1}{2}$ in.	Type of motors	GE-52—2-27 h.p.
Width over posts	8 ft. 8 in.	Wt. of car less elec. equip.	13,000 lbs.
Extreme width	9 ft. 1 in.	Wt. electrical equipment	4,390 lbs.
From track to sills	27 in.	Wt. of air brake equip.	1,200 lbs.
From sills to trolley boards	9 ft. 0 $\frac{3}{4}$ in.	Wt. of truck	5,400 lbs.
From floor to head lining	8 ft. 5 in.	Wt. of motors	3,450 lbs.
From track to step	14 $\frac{1}{2}$ in.	Total weight	27,440 lbs.



PAY-AS-YOU-ENTER CARS FOR COLUMBUS, OHIO

INTERESTING DOOR ARRANGEMENT

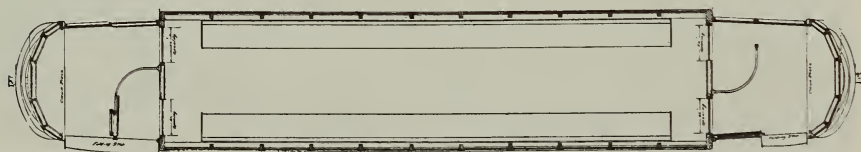
COLUMBUS has a population of about 200,000 and is laid out in nearly a square; consequently the street car lines are fairly short. The business district is largely centered in a short section along High Street about four blocks long. There are also a number of large manufacturing plants on the outskirts of the city. To provide rush hour service to meet the congestion caused by these conditions would tax the capacity of any line in a city of corresponding size. In order to best meet these conditions the Columbus Railway & Light Company has adopted as standard the P-A-Y-E type of car illustrated. Seven cars comprise this order, and four more with steel underframes are under construction. The G. C. Kuhlman Car Company designed the special type of steel underframe and side construc-



PAY-AS-YOU-ENTER CARS FOR COLUMBUS, OHIO. The platforms are 7 ft. 6 in. long and arranged for double-end operation. The trolley boards are trussed to bring most of the weight to bear over the body ends. Photographed on temporary trucks

tion of the order now in hand, which will be the subject of an article in an early issue.

The door arrangement is somewhat out of the ordinary. The vestibule doors at the step entrances and exits are of practically a standard P-A-Y-E type. At the center of each entrance side of the platforms there is a post to which the doors are attached and another on the platform which forms a stop for the doors and to which the conductor's railing is connected, the other end being fastened to the bulkhead partition. The entrance doors are single folding and the exit single swing, both having fittings to hold them open automatically. At the other side of the platforms is a single sliding door operated by the motorman. The bulkhead doors are of a rather unusual type. At the left hand side of the car, looking forward, there is a single door which slides into a pocket in the center of the bulkhead. The track is provided with stops to keep the door either open or shut. On the other side there is a double-acting single swing door attached to the corner post. This



PAY-AS-YOU-ENTER-CARS FOR COLUMBUS, OHIO. Seating capacity, 35. The rear entrance and exit doors are hinged to the center post and the front exit has a sliding door

swings in past the end of the seat and out against the pocket for the single exit sliding door. The roof is of the monitor deck type, with trussed trolley boards, bringing the principal weight over the bulkheads. The sides are straight and the underframe of wood substantially reinforced. The side sills are plated with $\frac{3}{8}$ x 15 $\frac{1}{2}$ -in. steel plates reinforced on the edge by 2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x $\frac{1}{2}$ -in. angle iron. The windows are of single sash type arranged to drop into covered pockets.

Length of body	31 ft. 6 $\frac{7}{8}$ in.	From sills over trolley boards	9 ft. 5 in.
Length over platforms . . .	46 ft. 6 $\frac{7}{8}$ in.	From floor to headlining . .	8 ft. 2 $\frac{1}{2}$ in.
Length of platforms	7 ft. 6 in.	From track to step	17 in.
Centers of side posts	33 $\frac{3}{4}$ in.	From step to platform	15 $\frac{3}{4}$ in.
Width over sills	8 ft.	From platform to car floor . .	8 $\frac{3}{4}$ in.
Width over posts	8 ft.	Seating capacity	35
Extreme width	8 ft. 5 in.	Wt. of car, less trucks, air	
From track to sills	2 ft. 10 in.	and electrical equipment	18,240 lbs.



PAY-AS-YOU-ENTER CARS FOR COLUMBUS, OHIO. At the front left side of the car is a sliding door, and at the right a hinged door. The window sashes drop into wall pockets

A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

IN the year 1868, and for a number of years before that time, J. G. Brill and his oldest son, G. Martin Brill, were highly esteemed foremen in the car works of Murphy & Allison, who built at that time city railway cars as well as freight cars. With the exception of one plant, that of Billmeyer & Small, at York, the Murphy & Allison was the only car-building establishment in Pennsylvania, and they abandoned the building of horse cars. Actuated by the evident need of a factory for this purpose, the two Brills decided to start in a small way



The brick building at the center of the photograph was built in 1871 and was the first of the, former Brill plant at 31st and Chestnut Streets

to supply this need. Their capital was thirteen hundred dollars. They leased a small shop at 31st and Chestnut Streets, working lustily with their own hands—and they were noblemen of mechanics.



The first cars built were for cable operation on an incline railway

Their ingenuity, fair dealing and industriousness appealed to the users of such cars, and they were awarded some important contracts. Within two years they bought the land on 31st Street, south of Chestnut, and built a good brick building. Finding that they had not sufficient working capital, they looked about for a partner, and James Rawle joined them, buying one-third interest in November, 1872. At this time John A. Brill, as a lad, was keeping the books and laying the foundation of his fine skill and ability in the business. The year 1873 was a disastrous year in finance in the United States. The new firm, J. G. Brill & Company, was fortunate in securing orders of considerable amounts for



An early order for Mexico was secured because other car builders would not undertake the construction of the peculiar type wanted. The cars were so satisfactory that many orders resulted

cars for Mexico, Cuba and other countries, and there was never a month in which they did not have some orders upon their books. By careful attention to meeting their payments, they

NOVEMBER, 1884.]

THE STREET RAILWAY JOURNAL.

15

J. C. BRILL & CO.,
PHILADELPHIA.

RAILWAY

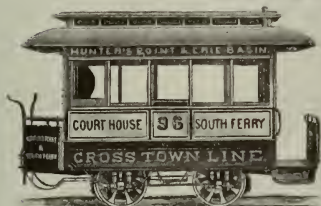
Builders of

— AND —

TRAMWAY

CARS

of all kinds.



The
Construction
of which we
have brought
to a high degree
of
Excellence.



GOLD MEDAL

— F O R —

BEST
Tram Car.



Chicago
Exposition of
Railway
Appliances.
1883.



CABLE ADDRESS—BRILL—PHILADELPHIA.

built up a good credit, and during the year 1873 they adopted the Central National Bank as their chief depository, and have continued the same relation ever since.

In 1875 they were visited by Mr. Culver, to

whom Coney Island owes its start. Mr. Culver stated that he came to see if the Brills could build him the cars he had decided upon, for no other car builder could. The Brill policy was to do what buyers wanted, and they took the orders, which were added to each year for many years. A Mexican company of wealth came to the firm for peculiar cars which they said no builder near New York would undertake; and the Brills worked out a combination of minimum height, low weight and other details which met the requirements, and many orders

resulted. Then followed many orders for the Coney Island railroads, Brighton Beach, Manhattan, Far Rockaway, Seaside lines, and a very hurried order for peculiar cars, built in sections, for Sidney, Australia.



One of the first lots of cars was built for the Market Street line, Philadelphia. Many of the cars of that period were highly ornamented. The one illustrated had a painting in the center of the convex panel portraying an Indian attack upon a Union Pacific track construction gang



A "bob-tail" car built for the Metropolitan Railroad of Washington in the early seventies

[TO BE CONTINUED]

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

American
Car Company
St. Louis, Mo.

G. C. Kuhlman
Car Company
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

Wason
Manufacturing Company
Springfield, Mass.

Danville
Car Company
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and

Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Mexico

International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Italy

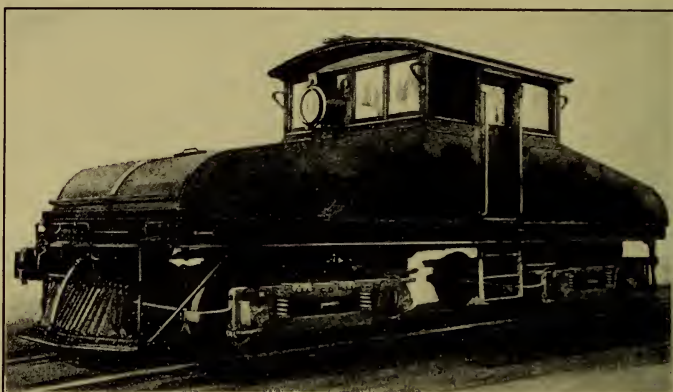
Giovanni Checchetti
Piazza Sicilia, 1
Milan

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai



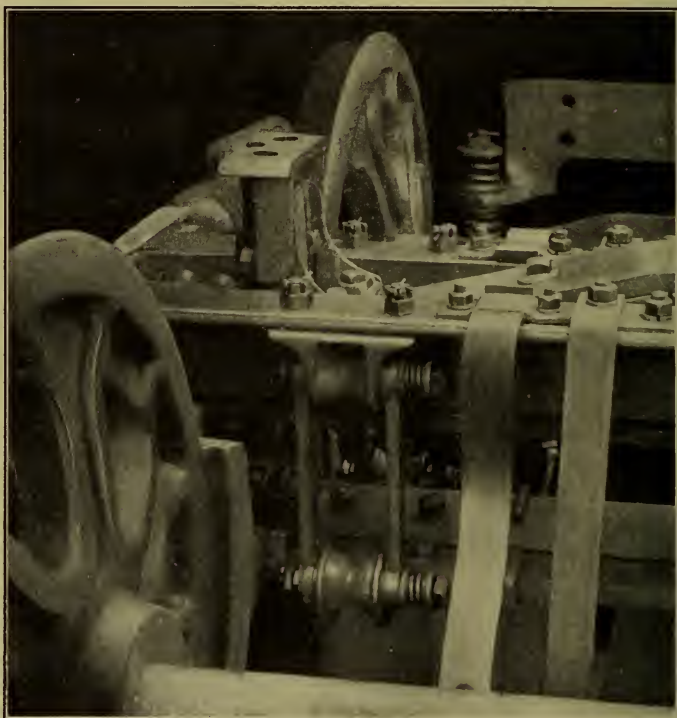
HEAVY ELECTRIC LOCOMOTIVES

The rapidly increasing number of interurban lines connecting with steam roads for the handling of freight traffic is making a considerable demand for locomotives fitted with steam car couplers and powerful enough to switch and draw a train of freight cars. The locomotive shown is of the design adopted by a number of the largest interurban systems, on account of the unobstructed view in every direction which the operator has from the centrally located cab and the ample space provided for loading the car to obtain the necessary traction for heavy trains. It is built on an all-steel frame, the sides and covers at both ends are steel, and the locomotive is fitted with steam car couplers.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE





BRILL HALF-BALL BRAKE HANGER

After being on the market but two years the number of these hangers now in use totals 10,000, and 162 different roads are using them. The pair of hanger forgings are held firmly in hemispherical sockets by spiral springs on bolts which are in tension against the spring but which carry no other load. The Brill Hanger is noiseless, self-adjusting and self-cleaning.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



A. W. Melinck

VICE-PRESIDENT AND GENERAL MANAGER, MICHIGAN UNITED RAILWAYS COMPANY

BRILL MAGAZINE

Vol. V

FEBRUARY, 1911

No. 2

ANDREW W. McLIMONT

[WITH PORTRAIT INSERT]

ANDREW W. McLIMONT, vice-president and general manager of the Michigan United Railways Co., began his career in Boston, 1886, as inspector of instruments and switchboards for the New England Telephone and Telegraph Co. He entered the employ of the Thompson-Houston Electric Co. in 1889 and was put in charge of 60 miles of overhead construction for the West End Street Railway of Boston. Similar work followed at Nashville, Brooklyn and elsewhere, and complete electric railway installations at Springfield (Ill.), Dallas, Marquette, Cedar Rapids, Nashville and Chicago. The Thompson-Houston Electric Co. was merged into the General Electric Co. about 1893 and Mr. McLimont went to Dubuque for the latter to reconstruct the lighting and railway system, remaining as general manager until 1895, and then going to New Orleans to construct 50 miles of overhead. Then followed five years in the Foreign Department of the General Electric Co., installing lighting and power systems in Brazil, Costa Rica, Argentina and Mexico. Returning to New York in 1902, he became consulting engineer to the Federal Electric Co., and after completing work in connection with railways at Monterey, Mexico, went to Lima, Peru, for W. R. Grace & Co., to design, construct and operate an interurban system and, later, the Lima Street Railways. Before leaving Peru he designed the complete electrification of the Central Railway System, comprising 133 miles. Mr. McLimont served the Public Service Commission, First District, New York, as electrical engineer from October, 1907, to March, 1909, when he became general manager and treasurer of the Chicago & Milwaukee Electric Railway Co. In June, 1910, he accepted the offices of vice-president and general manager of the Michigan United Railways Co.

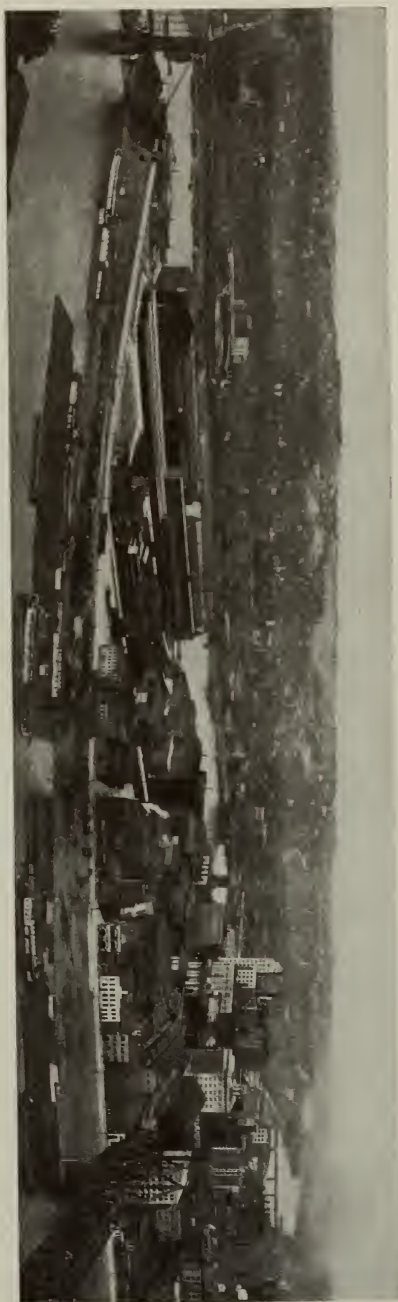
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

PITTSBURGH *

PITTSBURGH is situated in the western part of Pennsylvania, on a point of land between the Allegheny and Monongahela Rivers, where they join to form the Ohio River. Because of the navigability of these rivers and because of the fact that the Ohio furnishes transportation to the Mississippi, the larger part of the development of the western part of the United States was carried on for a long period from this point and gained for the city its appellation of "The Gateway of the West." The transcontinental railways had their first connections at this point, and, despite the barrier formed by the Allegheny Range of mountains, the city was, during a long period of the history of this country, the gateway of travel and commerce between the east and the west. The rich coal and iron deposits in the neighborhood, its oil and gas wells, have brought to it a wealth and commercial importance probably unequaled by any city of its size in the world. Pittsburgh is the greatest steel, iron, coke, petroleum and glass manufacturing center in the world. Its population is 535,000, and it is surrounded by a thickly populated manufacturing and ore-producing territory.

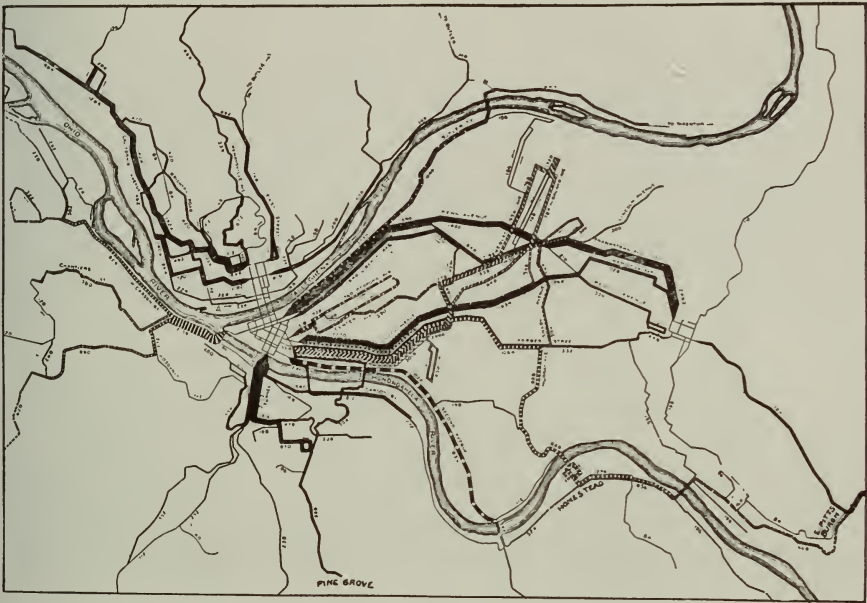
The business portion of Pittsburgh is confined within a triangular area, the junction of the two rivers forming the apex of the triangle, the base being a steep hill to the east of this section. The retail and wholesale business houses, banks and municipal buildings are concentrated here, while the residence sections are across the rivers and beyond the hill to the east. It is estimated that 40,000 persons use the cars in and out of the business district every day.

* The twenty-sixth article of this series.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. [The lower photograph is a continuation of the upper.] The business section of Pittsburgh has confined itself to the point of land at the confluence of the Allegheny and Monongahela Rivers and is barred from expansion by a steep hill to the east of the city. It is estimated that 40,000 persons go in and out of this section daily by the street cars

Because of the topographical conditions the transportation system is in several particulars more complex than in any city of the country; especially is this true of the short period of maximum load during rush hours. The congestion is so great at certain points that it would appear impossible for a larger number of cars to pass these points than at present, unless the streets were widened or wagons and other vehicles be prohibited from passing these points at certain hours, for, unfortunately, the vehicular traffic congestion coincides with the traction congestion points. The traction company has planned a new system of routes which, if the municipality will agree thereto, would appear to reduce the congestion very considerably by separating the loop terminals in this district and eliminating the crossing and recrossing of lines. The greatest congestion is between 5.30 and 6.00 P.M., when the number of cars is more than double that in service during the middle of the day. It not infrequently happens that the peak of the traffic in the evening is earlier or later than usual, and this without apparent reason, making the situation more difficult to provide for. Attempts have been made in other cities to arrange working hours of employees in different large establishments, to prevent stopping work at the same time and thereby assist in alleviating traffic congestion. But these efforts have not been successful, as employers and employees are so used to certain working hours that it seems impossible to alter them even by a few minutes. However, it is necessary for the public to do its part, by concerted and individual effort, to relieve the situation. Then, if the municipality does its part by giving its assistance to routing to the best advantage, furnishing proper police control to street traffic, the railway company will then be enabled and required to operate the maximum number of cars and adhere as consistently as possible to a schedule. Apparently the surface system of Pittsburgh will be able to fill the requirements and the increase in population for some years to



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Rush-hour seating capacity of the Pittsburgh lines, February 28th, 1910. 23,942 seats left business district during peak hour of evening rush. (Map reproduced from B. J. Arnold's Report)

come, provided it has the co-operation of the public and municipality.

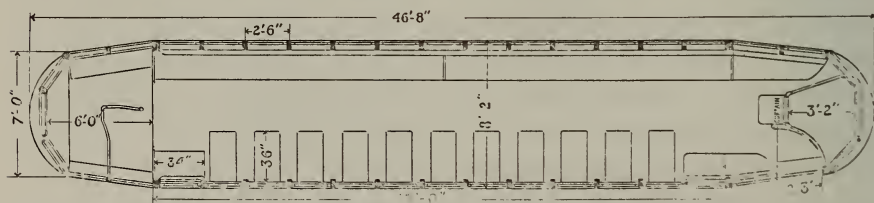
The Pittsburgh Railways Company, which operates all of the lines in Pittsburgh, was formerly known as the Pittsburgh and West End Traction Company, which took over a portion of the main underlying companies now composing its system, under an operating agreement which went into effect January 1st, 1902. The corporate organization of the underlying companies, and to some extent their independent corporate operation, was agreed to be maintained. The greater portion of the company's system is outside the city limits, and its operations are carried on in two cities, fifty-six boroughs and thirty-two townships, in each of which the franchises differ in terms and conditions, making it difficult to co-ordinate plans and principles of operation as a whole. The system has a trackage of 590 miles; 1790 passenger cars, 2 mail and 137



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The standard double-track car of the Pittsburgh Railways Co. Single-end operation. Steel bottom framing and side construction

service cars, 2 snow plows, 34 sweepers and 6 sprinklers constitute the rolling stock.

The recently adopted standard type of motor car for the Pittsburgh Railways is shown in the illustrations and was furnished by The J. G. Brill Company. These eighty cars have had a remarkable operating record in the few months they have been in service; for, although running on the lines of heaviest traffic and operated in express service during rush hours, there have been very few accidents and these of a minor character. This is due to the fact that the platforms and steps are entirely enclosed while the cars are moving. The cars are designed for single-end operation with prepayment entrance at rear. The bodies are of steel below the window sills; the posts and upper structure are of wood. No bulkhead is used at the front end of the car, and that at the rear has an opening 45 in. wide and is without doors. The rear platform is dropped and provision made for stepping down to the forward



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Floor plan of the above car, showing seating arrangement, prepayment entrance, and exits at front and rear



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. This seating plan, which accommodates 61 passengers, was adopted because of the limited width of the car, 8 ft. 2 in. over all

entrance by a portion of the floor being cut out in the shape of a quadrant. The motorman's position is railed off from the car, and these rails furnish convenient handholds for persons leaving from the front entrance. Two pipe stanchions behind the motorman support the surrounding railing and furnish a slide for a curtain to shield the motorman's window from reflected light from interior of car. A switch cabinet is located between these stanchions and secured to the roof of the car. The seating arrangement, as seen in the plan, combines transverse and longitudinal seats; this on account of the limited width of the car, which would not permit of sufficient aisle room if transverse seats were used on both sides. The seating capacity of the car, including the folding seat on the rear platform, is 61. As the weight of the car body, trucks and equipment is 46,000 pounds, the weight per seated passenger is 754 pounds.

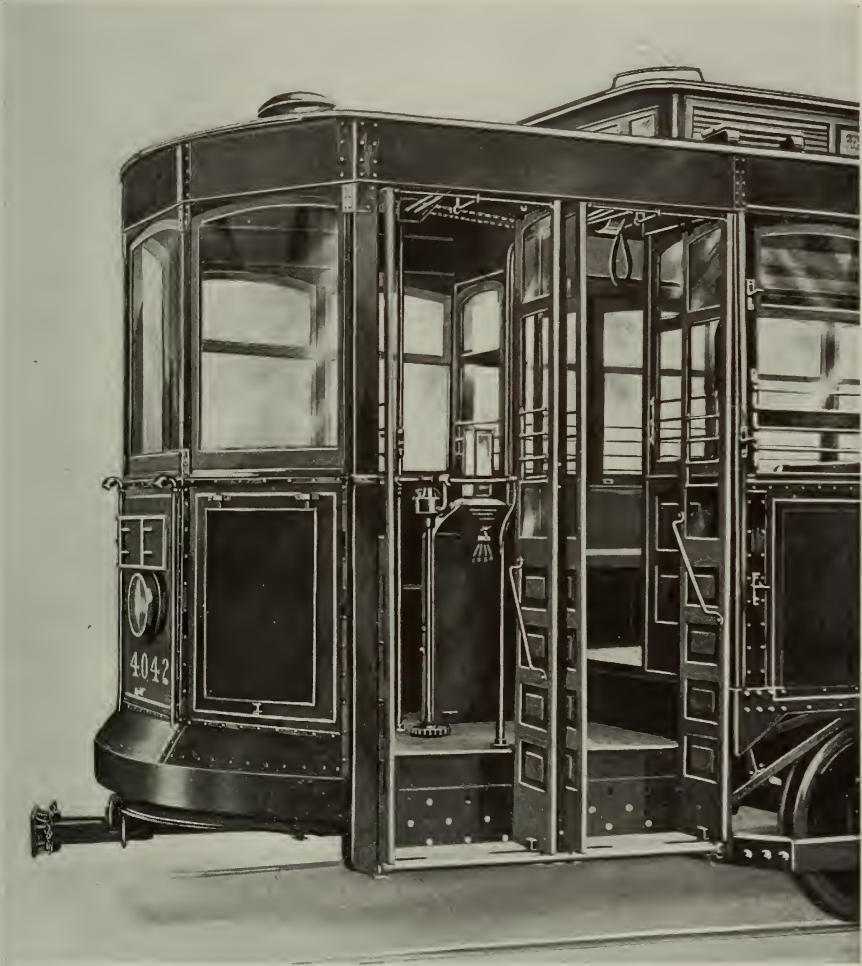
The entrance and exit at the rear platform are divided by

a vertical post, leaving each passageway of equal width. Both entrance and exit are closed with double folding doors, which may be opened or closed simultaneously or independently by the operating handles in front of the conductor's position, and the doors are automatically locked when they are either closed or opened. Each leaf of these doors is held at the top by a pivot which operates in the slotted track parallel with the door opening, and also by a swiveling sheave at one end of the top rail which runs on a track at right angles to the slotted track. A toggle arm attached to a sliding block above the door opening is fastened to the other end of the top door rail. When the sliding block is pushed outward the two

toggle arms attached to it spread out and force the two halves of the door apart. The sliding blocks, to which the toggle arms are fastened, move on horizontal pipe and are pushed outward by the rotation of a crank arm connecting rod. At the angle of the pipe railing surrounding the fare box is a vertical pipe containing within it a solid rod. The operating handle for one set of doors is



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of rear platform, showing door-controlling mechanism. The operating handles seen behind the fare box open or close the entrance and exit doors simultaneously or independently



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. In closing, the doors swivel around in pairs and come together flush with the edge of the step

clamped on the pipe, and another handle is clamped on the enclosed rod; the crank arms for moving the entrance doors are clamped on the top of the pipe, and a sprocket wheel is keyed to the top of the rod. A piece of bicycle chain connects this sprocket with another mounted on a vertical shaft near the bulkhead; on this shaft is clamped the crank arm for moving the exit doors. The exit door at the front

of the car slides back into a pocket in opening. It is operated by a pneumatic cylinder and piston mounted above the door, and is closed by the tension of a long spiral spring which opposes the pressure of the pneumatic cylinder. A valve mounted on the front of the vestibule beside the brake platform is used to admit and release the air in the cylinder to open and close the door. Patents have been granted to P. N. Jones, general superintendent of the Pittsburgh Railways Company, on the front and rear platform door mechanisms.

The steel underframe of these cars has plate girder sides $35\frac{1}{2}$ in. deep, composed of $\frac{1}{8}$ -in. plate with a top flange of special flat bar section and a 4 x 4-in. T for the bottom flange. The wooden posts are each bolted through two angles riveted to the plate and extending full width. The center sills are 4-in. channels; crossings, 4-in. channels; bolsters, 9 x 1-in. top and bottom plates with heavy cast fillers. The platforms are supported on channel knees of the Brill type.

These cars are mounted on Brill trucks of a special design, with the bolsters offset $3\frac{3}{4}$ in. from the center line to accommodate the large Westinghouse No. 303 interpole motor of 100 H. P., which is geared to one axle. The driving and trailing axles are connected on each side with $1\frac{1}{2}$ x 3 in. side rods and the quartered cranks. Counterbalance weights of



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Fifty light steel trailers were recently added to the rush hour equipment. This train has a seating capacity of 123



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The trailers are operated in either direction and are therefore provided with entrances at both sides. Folding seats occupy the space inside the unused doors

54 lbs. each are riveted on the web plates of the forged steel wheels opposite to the cranks.

The center-vestibule trail cars, which are also illustrated, were built locally, and have been in operation but a short time. These cars are of steel up to the letterboard, with the exception of floors and seats, and weigh 22,300 pounds including trucks, which with their seating accommodations for 62 passengers, makes the weight per passenger 360 lbs. The trucks on which these trailer cars are mounted have 22 in. wheels, which brings the floor down to within 30 inches above the rail, permitting only one step to be used. The principal dimensions of the trailer cars are: Length over all, 45 feet; width over all, 8 ft. 2 in.; step heights, 16 and 14 inches; truck centers, 22 ft. 6 in.

CARS FOR NEW LINE BETWEEN ST. JOSEPH AND SAVANNAH, MO.

BRILL No. 27-M.C.B. TRUCKS

ARRANGEMENTS are being made to commence operations on a new line between St. Joseph and Savannah, Mo., about March 1st, operating on an hourly schedule. The line starts from the outskirts of St. Joseph, about four miles from the center of the city and at the end of a division of the city railway system, and traverses a populous agricultural country over almost level land for a distance of ten miles to Savannah. The run, including the time from Savannah to the business district of St. Joseph, will be made in about one hour, and the rate of fare will be twenty-five cents.

The maximum gradient of the line is two per cent. The rails are 70-lb., A. S. C. E. specifications, laid upon a substantially constructed roadbed. The power will be furnished from the main power station of the St. Joseph Railway, Light, Heat & Power Co. and from a sub-station three miles south of Savannah which has a 300-k.w. motor generator set and uses 3-phase 11,000-volt transmission from a main station in St. Joseph.



CARS FOR NEW LINE BETWEEN ST. JOSEPH AND SAVANNAH, MO. A serviceable and attractive type of car for light interurban work



CARS FOR NEW LINE BETWEEN ST. JOSEPH AND SAVANNAH, MO. Interior of the passenger and smoking car, which differs only from the car shown on the opposite page in the substitution of the smoking for the baggage compartment

The cars are of two types—a straight passenger with smoking compartment, and passenger with baggage compartment (two of the former and one of the latter). The cars are of the same dimensions and have vestibuled ends with entrances at diagonally opposite corners. The lower sashes are arranged to drop into covered pockets and the upper sashes are stationary.

Length of body	33 ft. 4 in.	From platform to car floor	10½ in.
Length over platforms	44 ft. 4 in.	Seating capacity of combination pass. and baggage	32
Length of platforms	5 ft. 6 in.	Seating capacity of passenger and smoker	46
Length of smoking comp't	8 ft. 8 in.	Type of trucks	Brill No. 27-M.C.B.1
Length of baggage comp't	11 ft. 4 in.	Type of motors	GE 216—4-50 h.p.
Centers of side posts	2 ft. 8 in.	Wt. of car less elec. equip.	22,500 lbs.
Width over sills	8 ft. 4 in.	Wt. of electrical equipment	1,670 lbs.
Width over posts	8 ft. 6 in.	Wt. air brake equipment	1,500 lbs.
Extreme width	8 ft. 9 in.	Wt. of trucks	14,400 lbs.
From track to sills	3 ft. 1½ in.	Wt. of motors	11,430 lbs.
From sills over trolley board	9 ft. 8 in.	Total weight	51,500 lbs.
From floor to headlining	8 ft. 4¼ in.		
From track to step	17¼ in.		
From step to platform	16 in.		

INTERURBAN CARS FOR EASTERN PENNSYLVANIA

STEEL UNDERFRAME

ONE of the most important of the electric railway centers of Pennsylvania is the city of Easton, situated on the Delaware River and connected with Phillipsburg, N. J., by bridge. The Easton Consolidated Electric Company has lines which reach Nazareth and South and West Bethlehem and connect with the Lehigh Valley Transit Company's lines to reach Allentown and other cities in eastern and southeastern Pennsylvania. It is also the terminus of the Pennsylvania-Jersey Railway Company, a merger of the Northampton Traction Company, with lines connecting Easton, Bangor and Nazareth, and the Easton and Washington Traction Company, which operates a line between Easton, Washington and Port Murray, N. J.

The cars built by the Wason Manufacturing Company and delivered to the Northampton Traction Company are designed for interurban service with few stops. The roof extends over the vestibules in steam-coach style, and has three American Automatic Ventilators on each side. The



INTERURBAN CARS FOR EASTERN PENNSYLVANIA. While the service is interurban, the frequent stops require a type which is properly classified as suburban. Photographed on temporary trucks



INTERURBAN CARS FOR EASTERN PENNSYLVANIA. The windows are arranged in pairs, the upper sashes stationary and the lower to raise. Each corner seat occupies the space of two windows. The interior is finished in mahogany

sides are straight and the windows arranged in pairs, with the upper sashes stationary and the lower arranged to raise. The vestibules are closed with single folding doors at the entrance and double sliding doors at the bulkheads. The interior is mahogany inlaid, and the ceiling is finished in semi-empire style. The seats are upholstered in woven cane and arranged with six transverse and two longitudinal on each side of car. Each longitudinal seat occupies the space of two windows.

The car body is supported by an all-steel underframe. The side and end sills are 6 $\frac{1}{2}$ -in Z bars, reinforced respectively with yellow pine and oak to which is attached the side and end framing. Along the center of the underframe and extending from end sill to end sill there is a 12-in. channel, which makes an excellent location for pipes and wire con-

duits. The crossings are 5-in. I beams. The car sides are reinforced with a $\frac{3}{8}$ x 15-in. steel plate attached to the side sill and extending up inside the posts. This plate not only reinforces the underframe, but also adds to the strength of the side framing and serves as a brace to the side posts, which are bolted to it. The buffers are made of 7-in. channels.

Length of body	30 ft. 4 in.	From floor to headlining . . .	8 ft. 0 $\frac{3}{8}$ in.
Length over platforms . . .	40 ft. 3 in.	From track to step	17 $\frac{3}{4}$ in.
Length of platforms	4 ft. 11 $\frac{1}{2}$ in.	From step to platform	14 $\frac{1}{2}$ in.
Centers of side posts	30 $\frac{3}{8}$ in.	From platform to car floor . .	8 $\frac{7}{8}$ in.
Width over sills	8 ft. 3 $\frac{1}{4}$ in.	Seating capacity	40
Extreme width	8 ft. 5 $\frac{1}{4}$ in.	Weight of car, less electrical	
From track to sills	33 $\frac{3}{8}$ in.	equipment (approx)	18,000 lbs.
From sills over trolley boards	8 ft. 10 $\frac{3}{8}$ in.		



PREPAYMENT CARS FOR THE OMAHA & COUNCIL BLUFFS STREET RAILWAY

No. 39 SINGLE MOTOR TRUCKS

THE illustrations show an interesting type of P-A-Y-E car, 25 of which were furnished by the American Car Company to the Omaha & Council Bluffs Street Railway, and 25 more were ordered this month. These cars are for single-end operation, with completely vestibuled front end, and vestibule at rear end open at entrance side. The front platform is arranged as a motorman's compartment, with partition extending diagonally from vestibule corner post to bulkhead door post. The vestibule is enclosed with a double door, with step covered by sloping projections from the lower parts of the doors, composed of No. 14 rolled



PREPAYMENT CARS FOR THE OMAHA & COUNCIL BLUFFS STREET RAILWAY. Single-end P-A-Y-E car mounted on Brill No. 39-E single-motor trucks

steel. The rear platform has no doors at entrance or exit and is provided with the usual P-A-Y-E railing features, as will be seen in the illustrations. An additional railing is introduced at the rear of the platform.

The seating arrangement consists of five 34-in. transverse stationary back seats on each side of the aisle. Longitudinal seats occupy the space of three windows at front and rear of car, except that the longitudinal seat next the front exit



PREPAYMENT CARS FOR THE OMAHA & COUNCIL BLUFFS STREET RAILWAY. Opposite side of above car. Twenty-five cars were ordered in the initial installation of this type; twenty-five more are being built

door is cut off to leave a space of 16 in. from the inside of bulkhead. The seats are upholstered in woven cane. The lower window sashes are arranged to drop into pockets in the side walls, which are provided with hinged covers; the upper sashes are stationary. The upper sash of the central window on the entrance side is utilized for a roller destination sign. Wire netting guards extend the full length of the car, including the rear vestibule on the side opposite to the entrance.

The bottom frame has 5 x 7-in. side sills reinforced on the inside with 15 x $\frac{3}{8}$ -in. plates; the end sills are also 5 x 7-in., reinforced on the inside with 6 x $\frac{1}{2}$ -in. plates and on the outside by $\frac{5}{8}$ x 8-in. plates bent around the corner posts. The rear



PREPAYMENT CARS FOR THE OMAHA & COUNCIL BLUFFS STREET RAILWAY.
The platform arrangements are almost identical with those of the Montreal cars—the original P-A-Y-E cars

platform is supported by two inner knees of 6x4x $\frac{1}{2}$ -in. iron and outer knees of 3x3x $\frac{1}{2}$ x 8-in. Z-bars with oak fillers. The body trusses are made of 2 $\frac{1}{2}$ x $\frac{1}{2}$ -in. iron, let in flush on window posts 4 in. below the sash rail; the second window post from each end of car forms a strut for the truss, by being reinforced with a 1 $\frac{1}{2}$ x $\frac{3}{4}$ -in. flat bar bolted to the post. The under trusses are 1 $\frac{1}{4}$ in. in diameter.



PREPAYMENT CARS FOR THE OMAHA & COUNCIL BLUFFS STREET RAILWAY. Longitudinal seats occupy the space of three windows at front and rear, except that the seat next to the front exit is cut off 16 inches from bulkhead

The Brill No. 39-E trucks on which the cars are mounted have a wheel base of 4 ft. 6 in.; 21- and 33-in. diameter wheels; 3x6-in. and $3\frac{3}{4}$ x7-in. journals; $3\frac{7}{8}$ - and $4\frac{3}{4}$ -in. axle diameters; center of driving wheel to center of bolster, 23 in.; bolster centers, 19 ft. 10 in. The same truck has been specified for the 25 additional cars just ordered.

Length of body	29 ft. 4 in.	From step to platform	13 $\frac{3}{4}$ in.
Length over platforms	41 ft.	From platform to car floor	10 in.
Length of front platform	5 ft.	Seating capacity	40
Length of rear platform	6 ft. 8 in.	Type of trucks	Brill 39-E
Centers of side posts	2 ft. 7 in.	Type of motors	GE-80—2-40 h.p.
Width over sills	8 ft. 3 in.	Wt. of car body less elec. equip.	17,500 lbs.
Width over posts	8 ft. 3 in.	Wt. electrical equipment	6,540 lbs.
From track to sills	2 ft. 7 $\frac{1}{8}$ in.	Wt. of air brake equip.	1,500 lbs.
From sills over trolley boards	9 ft. 4 $\frac{1}{4}$ in.	Wt. of trucks	9,600 lbs.
From floor to head lining	8 ft. 3 $\frac{1}{4}$ in.	Wt. of motors	6,874 lbs.
From track to step	16 $\frac{9}{8}$ in.	Total weight	42,014 lbs.

CARS FOR ST. LOUIS WATERWORKS LINE

NO FARES COLLECTED

THE car illustrated is a type recently furnished by the American Car Co. to the St. Louis Waterworks Railway, a municipally-owned and operated single-track line carrying passengers and freight between the three pumping stations of the Water Department of St. Louis. The Low-Service Station is on the Mississippi River, at the Chain of Rocks, in the northernmost part of the city, eleven miles from the business district. Four miles south of this point is the Baden pumping station, and three miles farther south is the Bissell's Point pumping station, which is the southern terminus of the railway. The line is seven and one-half miles long, and there are eight miles of sidings and switches. Car loads of freight are handled by a locomotive and the package freight is carried on small flat cars drawn by the electric motor cars.

The railway is operated for handling the waterworks business primarily, but also carries a constantly increasing number of visitors. At the Chain of Rocks, in addition to the



CARS FOR ST. LOUIS WATERWORKS LINE. The car is equipped for double-end operation and has steam car couplers for drawing flat cars. Mounted on Brill No. 27-GE2 trucks

pumping station, there are settling basins and a coagulant plant for handling and treating the city's water supply. A beautiful park is situated on a high bluff overlooking the river at this point. As the car lines of the city system run no farther north than Baden, those who would visit the waterworks and park must use this railway; also, the residents of the district north of



CARS FOR ST. LOUIS WATERWORKS LINE. The vestibules have an entrance at one side only

Baden are dependent on this line for transportation. The city is not allowed to make any charge for this service, there being no provision in the city charter for the operation of a municipal railway system. Passengers must secure trip passes at one of the waterworks offices before they are allowed to board the cars. Monthly passes are issued to those using the cars continually. South of Baden only waterworks employees are carried on the lines, as the cars of the city system are available.

The car is arranged for double-end operation, with entrances placed diagonally opposite corners. Platforms are flush with the car floor and are completely vestibuled. The lower window sashes of the car are arranged to drop into



CARS FOR St. LOUIS WATERWORKS LINE. The lower window sashes drop into pockets; the upper sashes are stationary. The seats accommodate 48 passengers

the pockets in the side walls, and the upper sashes are stationary.

The trucks are Brill No. 27-GE2 type, with 4-ft. 6-in. wheel base, 5-in. diameter axles, 4x8-in. journals, and have a center pin load capacity of 26,000 lbs. per truck.

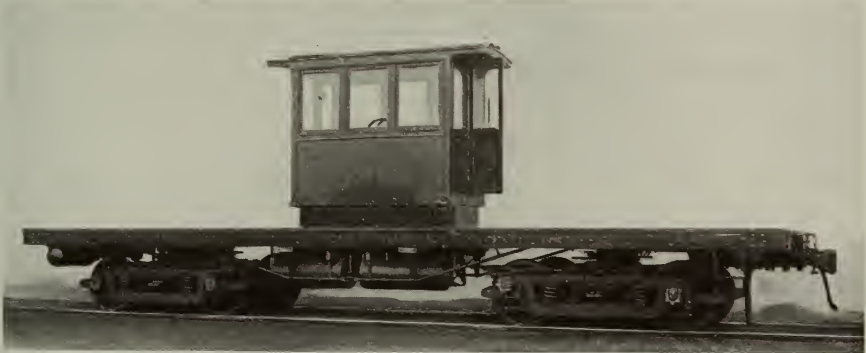
Length of body	32 ft. 8 in.	From step to platform, 11 in., 11 in., 10½ in.
Length over platforms	42 ft. 8 in.	Seating capacity
Length of platforms	5 ft.	48
Centers of side posts	2 ft. 8 in.	Type of trucks Brill No. 27-G.E.2
Width over sills	8 ft. 3½ in.	Type of motors GE57—2-50 h.p.
Width over posts	8 ft. 3½ in.	Wt. of car less elec. equip.
Extreme width	8 ft. 6½ in.	19,000 lbs.
From track to sills	3 ft. 2 in.	Wt. of electrical equip.
From sills over trolley boards	9 ft. 6¾ in.	2,250 lbs.
From floor to headlining	6 ft. 6 in.	Wt. of air brake equip.
From track to step	13¼ in.	1,500 lbs.
		Wt. of trucks
		14,000 lbs.
		Wt. of motors
		11,888 lbs.
		Total weight
		48,638 lbs.

CONSTRUCTION CAR FOR MISSOULA

BRILL NO. 27-M. C. B. TRUCKS

A CAR of a serviceable and convenient type for handling all kinds of construction material has recently been delivered to the Missoula Street Railway Company by the American Car Company. The side sills are $5\frac{1}{2} \times 7\frac{3}{4}$ -in. yellow pine plated with $8 \times \frac{5}{8}$ -in. steel plate, and the center sills are 7-in. I beams extending from end sill to end sill and with long-leaf yellow pine fillers on both sides. The end sills are $5\frac{1}{2} \times 7\frac{3}{4}$ -in. white oak and the crossings $3\frac{1}{2} \times 6\frac{1}{2}$ -in. white oak. The motorman's cab is in the center of the car and is $4\frac{1}{2}$ ft. wide by 8 ft. long. The base of the cab is elevated 18 in. from the floor of the car and the corner posts drawn in 12 in. at the sides to provide extra loading space for rails or long pieces of material. The interior is sheathed up to the window sills. A vertical brake wheel is used to economize space and the other operating devices are arranged compactly and located conveniently.

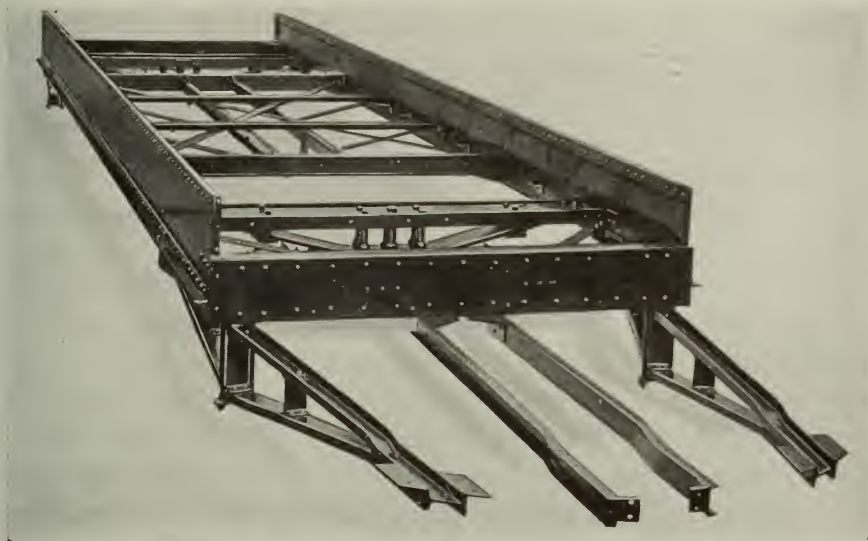
Length of body	36 ft. 0 in.	From side sills to trolley boards,	9 ft. $3\frac{1}{4}$ in.
Extreme width	8 ft. 10 in.	Type of trucks	27-M.C.B. 1
From track to sills	3 ft. $3\frac{1}{8}$ in.	Motors	G.E.-219 4-50 h. p.



EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY. The cab corner posts are drawn in 12 in. at the sides to provide additional loading space for rails

STEEL UNDERFRAMES FOR CITY CARS

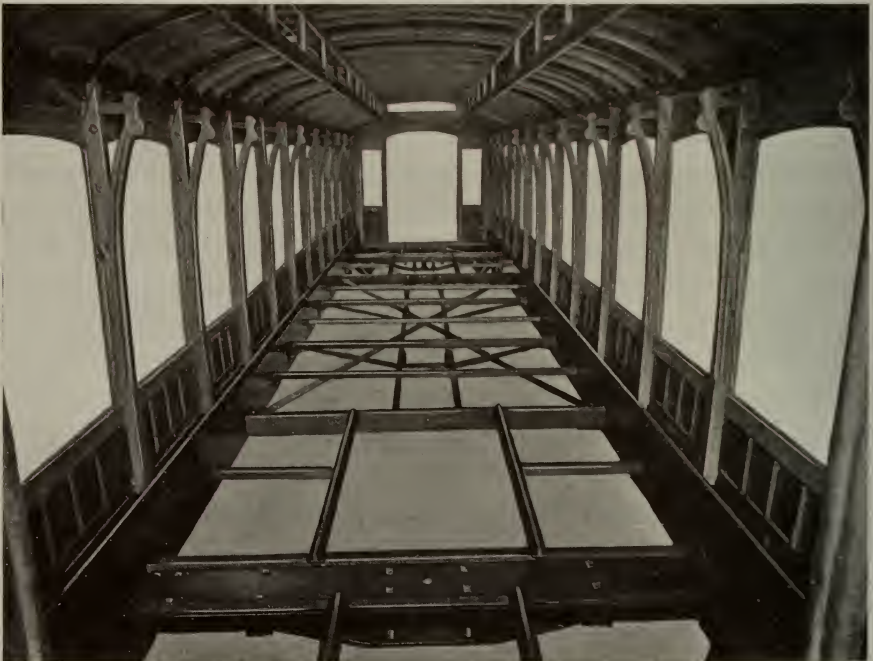
THE general trend of thought among thinking people for some little time has been directed towards greater internal economy in the conduct of business as a partial solution of the problem imposed by the higher cost of living, and more especially has scrutiny been directed towards those public service corporations whose corporate existence is dependent upon franchises granted by the people in exchange for adequate transportation facilities. This thought, in many cases, has crystallized into laws creating boards or commissions empowered to regulate and direct the general affairs of these public service corporations in their relations with the public and also empowered to enforce their regulation by drastic means if necessary. In nearly every case where transportation companies of cities are concerned, the first net result of this official supervision has been a demand upon the operating company to increase the transportation facilities, both by repairing existing rolling stock and by acquiring additional rolling stock. In acquiring new rolling stock it is evident economy to purchase the largest capacity of car that physical conditions will allow and that, moreover, some system of prepayment should be used; so it is evident that the increased size of the car, with the heavier load, often running at greater speed, make necessary a construction which will be very strong, and also one that should be as light as possible consistent with strength. Such a construction is found in a steel underframe, which is but slightly heavier than a wooden construction, and whose superior elasticity allows it to return to its original state of "squareness" after meeting the severe stresses imposed by the inertia of starting and braking, as well as those imposed by grades and curves. Moreover, street traffic is daily growing denser, and more heavily laden and speedy motor wagons bring an additional menace to that imposed by the normal



STEEL UNDERFRAMES FOR CITY CARS. An underframe for a 30-ft. 8-in. semi-convertible car body with 6-ft. platforms. Weight as shown, 4476 lbs.

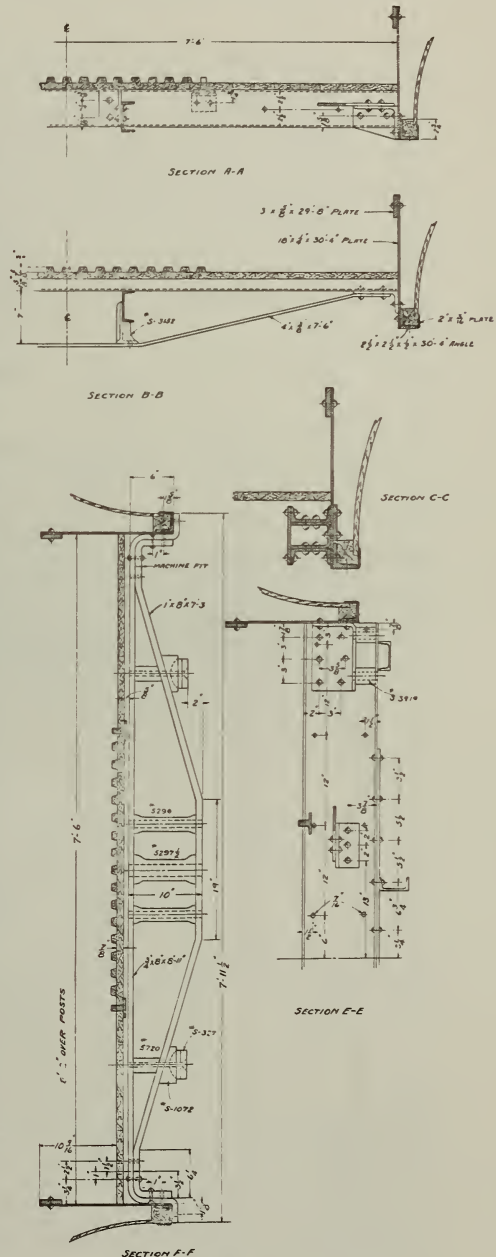
hazard of occasional collisions between cars at intersections; so the safety of passengers as well as maintenance and upkeep of rolling stock all demand a more substantial construction than of old, and this demand is met by the steel underframe. In a steel underframe construction the requisite strength should be secured with the least weight possible, and this weight not only should be disposed to the best advantage, but the parts of which it is composed should be as few as possible and as simply made, yet the whole underframe should be so put together as to allow a slight flexibility in meeting the many cross stresses to which it is subjected and at the same time return absolutely to "square" when the cross stresses are removed. In wooden underframes—even though the side sills have an additional steel plate—the weight of the platform, as well as the weight between bolsters, is carried in part by inside truss rods and by outside truss rods respectively, and these truss rods are so tightened when the car is building that an initial camber or set is given to the side sills to allow for set-

ting due to the wood and metal connections accommodating themselves to a mutual bearing dependent upon their unequal strength and elasticity and to the seasoning of the wood. These truss rods are also adjusted to overcome any deflection occurring after the car is in service, but this constant stress, first in one direction so as to cause a deflection and then in the opposite direction to correct the deflection and anticipate greater deflections, sets up a "fatigue" both in the metal and timber which eventually causes serious deterioration. It is thus seen that a construction whereby sill plate, inside and outside truss rods are combined is an ideal one, but structural conditions of all city cars, except those with straight sides, limit the height of the sill plates, and as the carrying capacity of a plate varies very slightly by an increase in thickness compared with an increase in height, we logically strengthen



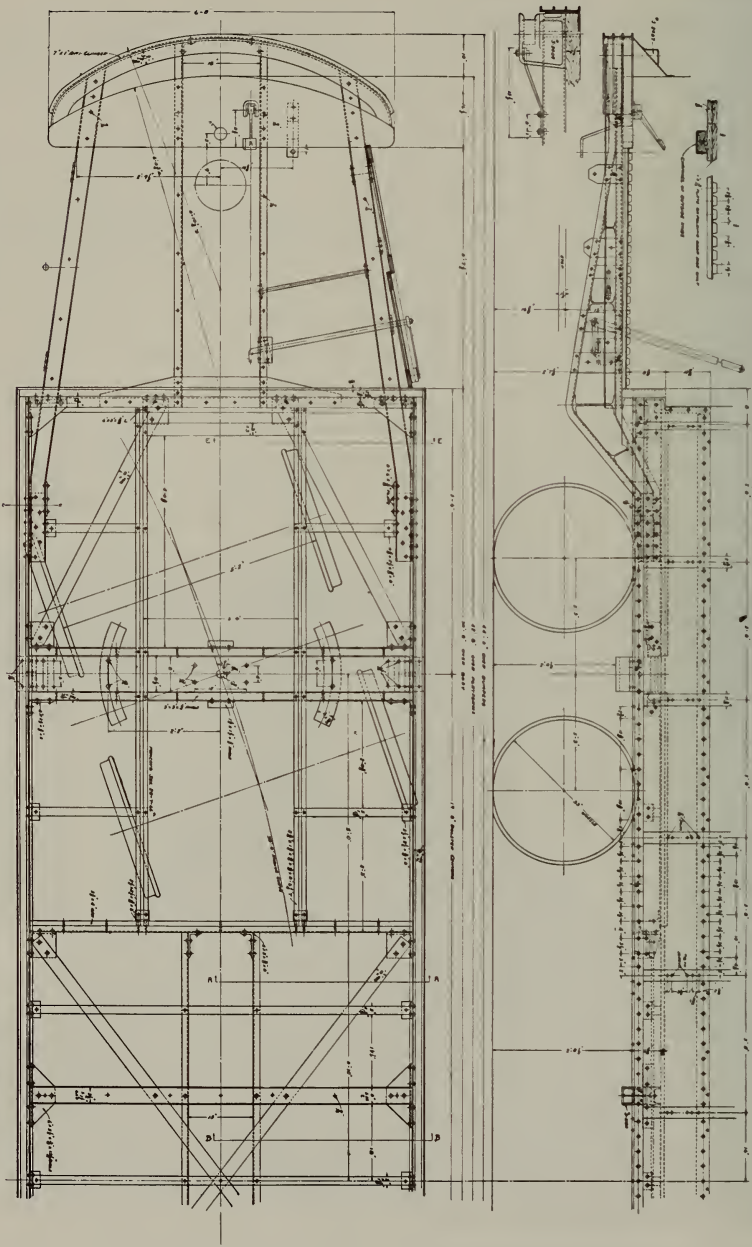
STEEL UNDERFRAMES FOR CITY CARS. The same underframe as shown in preceding illustration, with wooden upper structure of Brill semi-convertible type

the plate by adding metal along the top and bottom edges of the plate where strength is needed and make the plate only thick enough for stiffness. The metal added to the top and bottom edges of the plate also adds to its stiffness and replaces the functions of the truss rods; and the section along the bottom edge serves as a foundation for the car body posts. In this construction the section area of the plate can remain the same, while increased loads beyond as well as between truck centers due to increased platform length or to increased truck base can be met by increasing the sections at top and bottom edge of plate. As is shown in the under-frame diagram, a side sill construction of this type has been adopted by The J. G. Brill Company as standard, and one whose details can be designed to suit any condition of load while adhering to the general design, one that affords the maximum strength for a minimum weight of section. The platform loads are carried on Brill skeleton type



STEEL UNDERFRAMES FOR CITY CARS
Cross sections of frame, with reference letters
corresponding to diagram on opposite page

STEEL UNDERFRAMES FOR CITY CARS. Side elevation and plan of underframe shown in photographs on preceding pages



(patented) knees, which are open triangular trusses riveted to the side frame, and they can be built for any length of platform. The end sills are of substantial sections securely fastened to the side sills by forged corner brackets. The cross members, needle beams of truss type, and intermediate stringers between the cross members are of substantial section and transmit the floor load to the side sills as well as keep the frame square by their substantial connections. Diagonal braces between the bolsters and end sills and between the cross members also preserve the "squareness" of the frame



STEEL UNDERFRAMES FOR CITY CARS. Channel steel knee (patented) made for all lengths of platform

and prevent distortion. The bolsters are removable, and are either of cast steel or of the built-up type. The photograph shows the substantial and light construction of this underframe, which was built for a 30-ft. 8-in. semi-convertible car body with 6 ft. P-A-Y-E platform, the whole underframe, with knees, bumpers and bolsters complete, weighing but 4476 lbs.

Steel underframes for interurban and steam cars will so vary to meet operating conditions that no general description can be given that will cover them; but all that has been said here, and more besides, applies to the substitution of the steel underframe for the wooden construction, but there is not space here for even a partial discussion of their respective merits.

A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

II

AT this time (1880) the firm's chief business was that of building horse-railway cars. Very few improvements had been made in the contour and details of such cars. The Brills introduced a style of roof which had not been used, that of the clere-story for entire length, which style was followed by all builders from that time.

About this time a large order was received from Argentina for 400 cars, including ordinary passenger horse cars, open cars, funeral cars of three grades; also cattle cars, chicken cars and sleeping cars for the line to La Plata for horse traction, in which latter four horses were used, with relays every 10 miles. The trip, 70 miles, was made between sunset and sunrise. After a few years the railroad company adopted steam traction, and these small sleepers were set in the middle of 45-ft. platforms, built by the Brills, with kitchen at one end and dining room at the other. This somewhat large order loaded three large sailing vessels in the Delaware River at Philadelphia.

As before stated, the intent and aim of Brill & Company

was the building of street railway cars, in which branch there was at that time so great dearth; but during the years from 1880 a considerable number of passenger coaches for steam



The earliest summer cars were crude but popular

railroads were built by them.

No distinguishing inventions were made during those seven years, excepting that cable traction was introduced, and many cable cars were built by this firm for Philadelphia and New York roads. The art seemed to be holding itself for something new—it hardly knew what, until it came—and it was Electric Propulsion. It seemed proper that the first move in this direction should be made in the city of Franklin.

In 1886 the decision to incorporate the firm was arrived at, and it was incorporated under the laws of Pennsylvania in 1887, with the title of J. G. Brill Company, with J. G. Brill as president; G. Martin Brill, vice-president and general manager; James Rawle, treasurer and secretary; John A. Brill, manager of sales.

In the year 1888 this concern met with the first loss among its personnel in the death, on September 22d, of John George Brill, the president, who died after an illness of a year or more. In Mr. Brill were clustered all of the qualities which

lead to success and achieved honor: ability of high degree, loyalty to friends and associates, intense industriousness, generosity and goodness of heart.

To him succeeded as president, G.



The first order for steam cars was for a short line along the Delaware River opposite Philadelphia



The only sleeping cars ever built for animal propulsion

Martin Brill, whose training had been laid by his father in such manner that no degree but the highest to be reached by him in his vocation would satisfy him.

In the year 1887 the first electric cars were built. The earliest for an experimental line for Leo Daft, electrical engineer. Soon thereafter cars for Green Ridge-Scranton lines. These latter were placed upon the first electrical trucks designed by

G. Martin Brill and John A. Brill. The engineer of that line raised marked objection to the use of trucks, but Mr. George Sanderson, the owner, was determined to try them; and, incidentally, the engineer in question, upon seeing the trucks, at once hustled to Washington to try to secure patents upon this method.

The very first cars tried had motors set on the car floor in the front doorway, with sprocket chains for transmission; but this crude method went no further when the first trucks were put forth. A leading item in the construction of trucks which went under horse cars was the strong top chord designed for the purpose of holding the car body frame rigid and square.



Interior of the car shown in the lower illustration on preceding page
These cars had sleeping accommodations for eight passengers

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

American
Car Company
St. Louis, Mo.

G. C. Kuhlman
Car Company
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

Wason
Manufacturing Company
Springfield, Mass.

Danville
Car Company
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Mexico

International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Italy

Giovanni Checchetti
Piazza Sicilia, 1
Milan

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai



BRILL CENTRIFUGAL SPRINKLING CAR

Investigation shows that street sprinkling by horse-drawn sprinkling wagons costs cities at least sixty cents a mile. The cost does not exceed twenty-six cents if done by Brill Centrifugal Sprinklers, and this cost includes current consumption, employees' wages, interest on investment and depreciation. A contract for two sprinklings a day for six months at forty cents a mile would net over five thousand dollars on one hundred miles of street. The real profit, however, comes from the increased number of passengers—street sprinkling is an important factor in developing the "riding habit." Single- and double-truck sprinklers of various tank capacities are shown in catalogue.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



San Juan de Letrán
Mexico City



BRILL FARE BOX NO. 4

Thirty-two different railways are using this portable box. It is a ticket as well as a coin collector and is made with and without totalizer. The drawer holding the cash till can only be drawn out, after it is unlocked, by pulling back the handle which operates the tilting plate—no fares can be left in the receiver. Pulling out the drawer automatically and positively locks the cash till. Turning upside down locks tilting plate. Height, $20\frac{1}{2}$ ins.; weight, 35 lbs.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE

Vol. V

MARCH, 1911

No. 3

CHARLES S. SERGEANT

[WITH PORTRAIT INSERT]

CHARLES S. SERGEANT, vice-president of the Boston Elevated Railway Company, was born in Northampton, Mass., in 1852. After graduating from the Northampton High School at the age of 16, he began business in the First National Bank of Easthampton, Mass., where he remained four years; then, going to Marquette (Lake Superior), Mich., he began his railroad experience and remained there in railroad work and iron smelting until 1876, when he removed to Boston to enter the service of the Eastern Railroad, of which he soon became general auditor, and after seven years of service became associated with the fiscal agency in Boston of the group of western railroads known as the Thayer Merriam roads. In 1888 he entered the street railway business as general auditor of the West End Street Railway Company, which had then been formed by consolidation of all the Boston street railways. He served successively as general auditor, second vice-president and general manager of that company, and upon its lease in 1897 to the Boston Elevated Railway Company he was appointed successively to the offices of second vice-president and vice-president of that company, having charge of the Bureau of Operation. In his experience with the Boston street railway system, Mr. Sergeant has seen the development of a surface horse railway, transporting in 1888 about 96,337,000 revenue passengers, into a combined system of surface, overhead and underground traction which was last year called upon to transport 296,165,915 revenue passengers.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

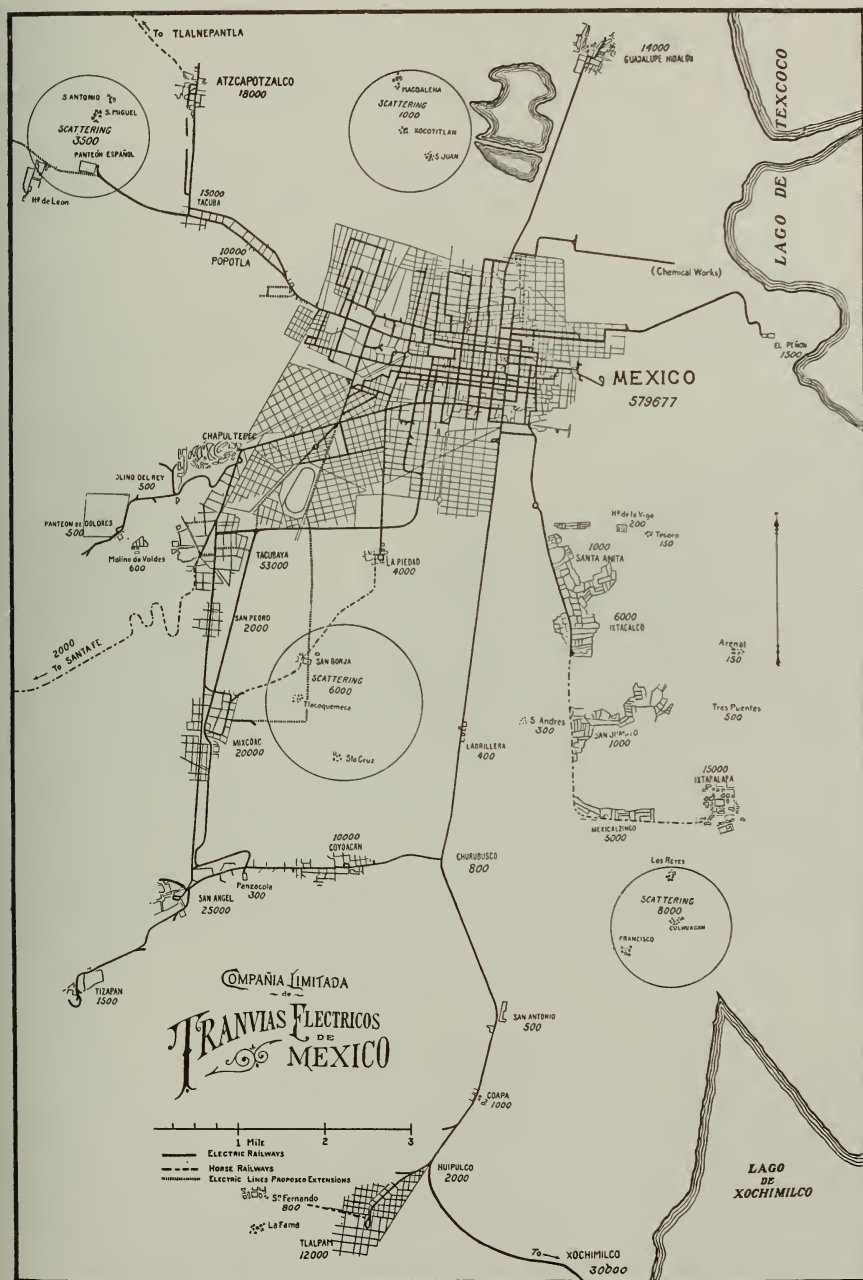
MEXICO CITY *

MEXICO CITY, besides being the capital of the Mexican Republic, is its metropolis and commercial center. It has a population of about 600,000 people, and the Federal District, not including the city, has about 300,000 more, making a total of 900,000 people who are served by the street railway system of the Mexico Tramways Company. The Federal District corresponds more or less to the District of Columbia, in the United States, as it contains the capital of the Mexican Republic. Its chief official is the Governor of the Federal District, but he is independent of the Governor of the State of Mexico, within which the Federal District is located. Mexico City, although situated in the tropical zone, on account of its elevation of 7,500 feet above the sea level, has a temperate climate, with no excessive heat, and at night a very cool temperature, usually about 50° Fahr., and in the winter season as low as 30° Fahr.

The population includes a large percentage of foreigners, among whom Americans constitute the largest colony. Many of the principal commercial, mining and engineering enterprises are conducted by foreigners, and chiefly by Americans. The chief industries of the state are in the cotton mills, tobacco factories, grist mills, machine shops, foundries, and the usual industries of a large city.

Mexico City, as it is to-day, is one of the finest and most impressive on the American Continent, as it combines many fine buildings of old Spanish architecture and the most modern buildings of fireproof construction. Among the former are the famous Cathedral, the President's Palace, the Munic-

* The twenty-seventh article of this series.



ipal Palace, and many churches, while among the latter are the Post Office, the theatre, the Communications building, the normal school, etc., not to mention hundreds of beautiful residences, clubs, etc.

The lower classes, composed chiefly of Indians, cling to their ancient customs and means of living, and their crude dwellings are in great contrast with the modernized city. The government has taken steps to alleviate the lower classes and teach them to live in a sanitary and healthful way, which soon should have its effect in generally benefiting the health of the city.

The electric railway system, as the map shows, covers the city with a network of lines, and extends into the Federal District in every direction. It has been the chief factor in the expansion and improvement of the city and its suburbs, and is more closely related to the life of the citizens of Mexico than is the case in most cities. The cars are used by all classes in their daily life, for business and pleasure, for attending religious services and funerals, and for the transportation of building materials, merchandise, household goods, etc. The company operating the system is the Mexico Tramways Company, a Canadian company with its head office in Toronto, Ontario. This company owns and operates all the electric lines in the City of Mexico and the Federal District, consisting at the present time of 158.62 miles of electric lines, and 21.31 miles of mule lines. In the near future the mule lines will disappear, as they will be electrified. Additional concessions have been lately acquired, and new lines will be constructed, further extending the system. One of the lines proposed is an interurban division to Puebla, capital of the state of the same name, and a city of about 100,000 people. This line will be about 103 miles in length, and passing through Amecameca will climb the west slope of the Volcano of Popocatepetl, reaching an elevation of 13,600 feet, at which point the railway will be nearly up to the snow line, and

within easy distance of the summit of Popocatepetl on one side, which has an altitude of 17,798 feet, and Ixtaccihuatl on the other, with an altitude of 16,076 feet. Both of these volcanoes are extinct and are snow clad the year round. This line will form one of the grandest scenic railways in the world, and much of its way will pass through wheat fields and pine



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Ornamental center poles are used to carry the overhead construction on the lines traversing avenues

forests. From its summit the panorama embraces hundreds of miles and it is possible to see in the distance the green sugar cane fields, 9,000 feet below, far down in the hot country.

Another proposed extension is to the city of Toluca, which has a population of about 30,000 people and is about 45 miles west of Mexico City.

Within the last five years the present company, of which Dr. F. S. Pearson is president, has developed a system and has

established a standard of service and equipment not excelled by the most advanced in any part of the world, and this in the face of many abnormal conditions of customs, people and language. The service is divided into city and suburban, first- and second-class, freight and funeral, each one requiring its own special equipment. The city service is equipped with first-class cars with a uniform fare of 6 cents Mexican currency, the



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE Handling a crowd at a bull fight. The largest bull ring in Mexico City is a steel and concrete structure accommodating 30,000 people

cars being for the most part double-truck cars, although there are some single-truck cars in this service. The suburban service is chiefly operated by trains, motor cars being first-class and the trail cars second-class, but in addition there are certain lines operating only first-class motor cars and separate second-class motor cars. The types of cars are of the best and the truck and motor equipment strictly up-to-date. For the suburban business, a special express or "Rapido" service has been established, consisting of express trains from the principal suburbs to the center of the city. These trains are operated

into the city in the early morning, returning to the suburbs at 1 o'clock and again back to the city at 2.30, returning to the suburbs again at 7 in the evening. The longest route served by this service is 11 miles, and the run is made in 30 minutes, the "Rapido" making only two or three stops in the run.

The freight service is supplied by trains of two cars each, the motor car being either a closed or a gondola type with gondola trailer. These cars have a capacity of about 30 tons. The equipment for transportation in connection with funerals is varied, and consists of many types, to suit all the various conditions of life, even in Mexico. This system grew up from the fact that the cemeteries are, with one exception, a number of miles outside of the city, and the roads leading to them in the past were rough country roads. The service supplied by the company is so satisfactory in this regard that it might well be imitated by other cities.

In addition to the above, the company operates for special occasions a number of fine private cars, which are chartered for private parties, and are used by public officials and for the "Seeing Mexico" service, which is especially attractive to the foreign traveler on account of the many points of beauty and historic interest which are reached by this service. The car equipment consists of the following: First-class passenger motor cars 240, trail cars 26, second-class passenger motor cars 8, trail cars 122, freight motor cars 42, trail cars 72, funeral equipment 85.

The J. G. Brill Company and the American Car Company have furnished 154 cars and a large number of the trucks used on this system. The Brill semi-convertible type is well represented among the types used. The Mexico Tramways Company has built in its own shops all of its cars added to its equipment during the last four years. The shops are located near the head office of the company in the section of the city known as Indianilla, where also are located the principal car

barns, the steam power house and storage battery, overhead line and track departments, dispatcher's office, printing shop, inspection shop, etc. The machine shop is entirely manned by Mexicans, who are satisfactory workmen. Motormen and conductors are also native Mexicans, and are most satisfactory employees. The company also has in other parts of the city two large car barns and freight yard, besides two blocks devoted to the storage of general stores and construction materials.

The method of operating the system is not peculiar, except that most of the cars pass round the central plaza, following the loop system, so that at this plaza it is possible to take cars going direct to almost any point on the system. Another feature is the use of two adjoining parallel streets with a single track on each street instead of double tracks. This is necessary in the old part of the city, on account of the very narrow streets.

The principal operating difficulty arises through the very heavy traffic on feast days, Sundays and other holidays, at



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Standard city car mounted on Brill No. 27-G Trucks. The exterior appearance of first- and second-class cars is almost identical



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Short city car mounted on Brill No. 21-E Truck

which time the people largely move to some one point to attend a religious festival, or possibly a bull fight. There are two principal bull rings, the largest one of which is constructed of steel and concrete and will accommodate 30,000 people. At times when there are large gatherings through widely different parts of the city, it taxes the company's equipment to its very limit to accommodate the public. This the company is doing in a very satisfactory way, largely through the use of very long open trail cars which are attached to the suburban motor cars. A number of the suburban lines reach popular points of interest, such as parks, lakes, country club, beautiful suburbs, etc. This business has been carefully developed, and the service is both adequate and attractive. In the crowded narrow streets in the central portion of the city the cars necessarily move at a slow rate of speed. To properly control the speed, cars have been equipped with special controller handles, which prevent the turning of the controller beyond the point at

which the motors operate in series. At the limit of the low speed zone, handles are exchanged for the regular type of handle. Smoking is only permitted on open trail cars and on second-class cars. The second-class cars, both motor and trail, are equipped with large side doors for the handling of all kinds of packages, farm produce, fruit, flowers, etc.,



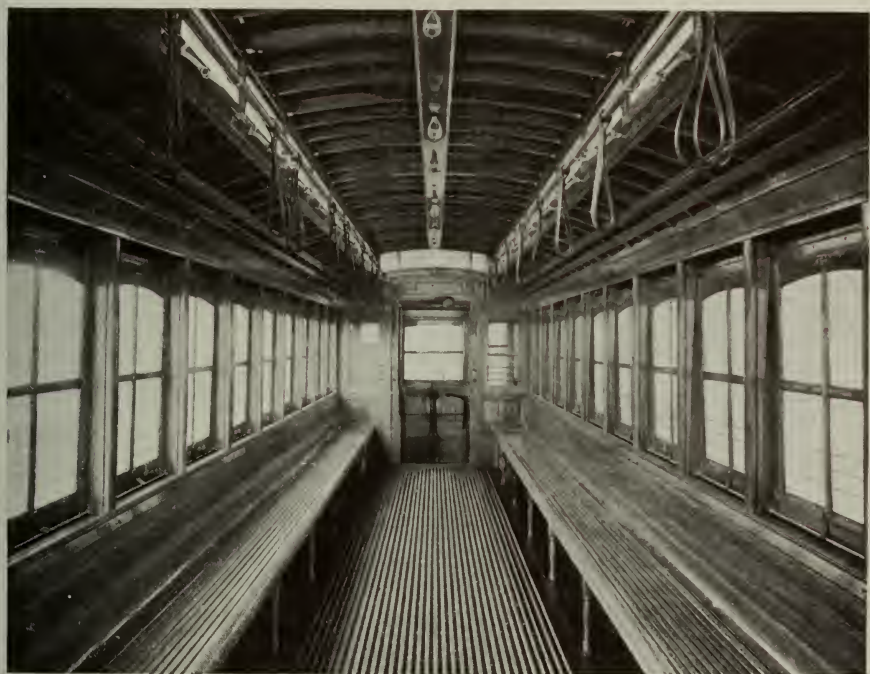
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of double-track city car of Brill semi-convertible type

when in charge of a passenger or passengers, the largest package carried being an upright piano. The charge is proportionate to the dimensions and weight of the article carried.

The type of track construction used in the city proper, and on all paved streets, consists of a solid mattress of reinforced concrete under each track, in which steel channel ties are imbedded. The rails are 80- and 114-lb. girder sections with

continuous joints and tie rods. On all suburban and inter-urban lines, most of which are upon private right of way owned by the company, 70-lb. A. S. C. E. Tee rails are used, laid on creosoted ties, substantially ballasted with crushed stone.

The company obtains its power from the hydro-electric



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of second-class double-truck car

plant of The Mexican Light & Power Co. Ltd. This plant is 90 miles from Mexico City, and supplies power, not only to the Mexico Tramways Co. but to the whole of the Federal District and all the large mining camps at Pachuca and El Oro. Transmission lines are carried on steel towers and operate at a potential of 70,000 volts. The power is distributed from the main receiving station of The Mexican Light & Power Co. to seven sub-stations of the Mexico Tramways Co. located in

different sections of the city and the Federal District, two of these stations receiving the current at 3,000 volts and the others at 20,000 volts A. C., distributing it again at 600 volts D. C. In addition to these sub-stations, the company has equipped a steel car with a motor generator set and switchboard of 500 K. W. capacity, and this is used as a sub-station, being connected to the A. C. lines of The Mexican Light & Power Co. Ltd. at any point on the system where abnormal conditions require additional temporary power.

All city fares are 6 cents, but on leaving the city limits the fare increases in proportion to the distance, the basis of charge being 3 cents Mexican currency for each mile traveled. The second-class fare is about 40% less than the first-class fare. The European system of fare receipts, viséd by inspectors, is in force and has been found very satisfactory, not only to the company but to the traveling public.



SHIPMENT OF DOUBLE-DECK CARS TO CONCEPCION, CHILE

BRILL No. 21-E TRUCK

TEN cars of the type illustrated were shipped a few weeks ago to the Compania Electrica de Concepcion by The J. G. Brill Company, with whom the order was placed by W. R. Grace & Co., New York. Concepcion is an important manufacturing city and is the commercial center for a large surrounding territory. It is 350 miles south of Santiago, with which it is connected by rail, and it is also connected with all of the chief cities in the Republic by rail

and by steamship lines from its port, the city of Talcahuano, 9 miles distant. The electric railway system includes a line to Talcahuano, over which are operated first- and second-class double-truck cars, built by the John Stephenson Company. Brill cars and trucks have been in use on the city lines since their electrification, and the present order is to supplement this equipment and obviate the use of trail cars, except for rush-hour service.



SHIPMENT OF DOUBLE-DECK CARS TO CONCEPCION, CHILE. Ten of these 40-passenger cars with Brill No. 21-E Trucks were shipped a few weeks ago to southern Chile

The cars are substantially built to enable them to carry a heavy load on the upper deck without straining the members under rapid starting and stopping. The side sills of yellow pine are $4\frac{1}{2} \times 5\frac{1}{2}$ in.; oak end sills, $3\frac{3}{4} \times 4\frac{3}{4}$ in.; oak cross-ings, $3\frac{1}{2} \times 4$ in. The corner posts are of ash, $3\frac{5}{8}$ in. thick; ash side posts, $2\frac{1}{4}$ in. thick; sweep of posts, $2\frac{1}{2}$ in. Steel rafters $\frac{5}{8}$ in. thick are sandwiched between the wooden rafters to relieve to best advantage the strains from the trolley apparatus. Cherry slat seats covered with Wilton carpet and double-coated curtain materials are durable, and, with the ash



SHIPMENT OF DOUBLE-DECK CARS TO CONCEPCION, CHILE. The interiors are finished in ash of natural color. The window sashes drop into wall pockets

finish of the interior, bronze trimmings make a bright and attractive appearance.

Length of body over corner posts	15 ft. 11 $\frac{1}{8}$ in.	Height under side of side sills over trolley boards . .	12 ft. 10 $\frac{3}{4}$ in.
Length over platforms . .	27 ft. 11 $\frac{1}{8}$ in.	Height floor to center of rafter	6 ft. 8 $\frac{1}{4}$ in.
Length front platform . . .	6 ft.	Height track to top step tread	12 $\frac{1}{2}$ in.
Length rear platform . . .	6 ft.	Height step tread to car . .	13 in.
Centers of side posts . . .	3 ft. 0 $\frac{1}{2}$ in.	Height platform to car floor . .	6 $\frac{3}{8}$ in.
Width over sills, including sheathing	6 ft. 1 in.	Seating capacity	40
Width over posts at belt . .	6 ft. 5 in.	Type of trucks	21-E
Extreme width	6 ft. 7 $\frac{1}{2}$ in.	Type of motors	G.E. 54
Height track to under side of side sills	2 ft. 4 $\frac{5}{8}$ in.	Total wt. less electrical and air equipment	12,275 lbs.

PREPAYMENT SEMI-CONVERTIBLE CARS FOR MACON, GA.

BRILL PLAIN ARCH ROOF

THE Macon Railway & Light Company, of Macon, Ga., has lately added to its equipment six cars of the type illustrated, built by The J. G. Brill Company. Up to the time of the receipt of the new cars, there were 55 motor and 20 other cars in operation on the 31 miles of trackage comprising the system. The Pay-As-You-Enter System has been introduced in Macon by means of these cars, which represent, in every particular, the most advanced ideas in car construction and operation. The photographs show the excellent appearance of the exterior and interior, especially the bright and attractive appearance of the latter. With the semi-convertible windows all raised into the roof pockets, the cars appear from the interior to be entirely open at the sides; this is on account of the extra height of the windows and the low window sill. Natural draft ventilation, with Globe ventilators, is used. The platforms have the usual P-A-Y-E arrangements, except that the entrance and exit at the rear are closed by a folding gate hinged to the vestibule corner



PREPAYMENT SEMI-CONVERTIBLE CARS FOR MACON, GA. The platforms are of the usual P-A-Y-E type, except that a high folding gate hinged to the vestibule corner post is used instead of doors



PREPAYMENT SEMI-CONVERTIBLE CARS FOR MACON, GA. When the window sashes are all raised into the roof pockets, the extra high window openings give the appearance of an entirely open summer car

post. The exit at the forward end is closed by a sliding door with mutually operating step; the step at the rear is also operated mechanically.

The exit door in the body ends slides into the bulkhead and is operated by the motorman by means of a pedal. The upper part of the vestibules are fitted with double sash, the top sashes arranged to drop and the lower sashes are stationary. Small lights of glass are placed over the drop sash with roller sign in the center window. The seats are of the Brill "Winner" type, 36 in. long, and the aisle is 22 in. wide. A single seat is placed longitudinally at each corner and at two of the corners an additional seat is provided, which is hinged and arranged to fold up. The lighting arrangement furnishes a lamp over the center of each seat. The cars are built with all-steel underframes of the Brill standard type described and

illustrated in the February issue of BRILL MAGAZINE. The entire underframe of the car, with platform knees, bumpers and bolsters complete, weighs but 4476 lbs. The cars are mounted on Brill No. 39-E1 trucks, with 4-ft. 6-in. wheel base and 33- and 21-in. wheels. The trucks have A. E. R. A. brake shoes.

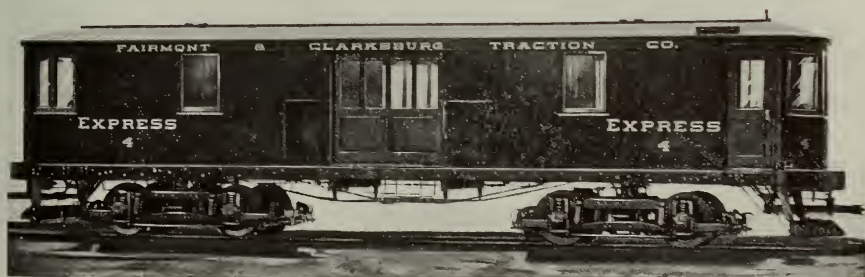
Length of body	30 ft. 8 in.	From step to platform . . .	14 in.
Length over platforms . . .	42 ft. 8 in.	From platform to car floor .	10 1/8 in.
Length of platforms	6 ft.	Seating capacity	41
Centers of side posts	2 ft. 8 in.	Type of trucks	Brill 39-E1
Width over sills	7 ft. 11 1/2 in.	Type of motors	GE-90—2-50 h.p.
Width over posts	8 ft. 2 in.	Wt. of car body less elec. equip.	15,400 lbs.
Extreme width	8 ft. 5 3/8 in.	Wt. electrical equipment . .	10,500 lbs.
From track to sills	2 ft. 7 9/16 in.	Wt. of air brake equip. . . .	17,000 lbs.
From sills to trolley boards .	9 ft. 3 1/8 in.	Wt. of trucks	9,400 lbs.
From floor to headlining . .	7 ft. 9 7/8 in.	Wt. of motors	5,750 lbs.
From track to step	14 7/8 in.	Total weight	33,300 lbs.



EXPRESS CARS FOR FAIRMONT & CLARKSBURG TRACTION CO.

HIGH-SPEED SERVICE

TWO express cars of an interesting design have been recently received by the Fairmont & Clarksburg Traction Company, of Fairmont, W. Va., from the G. C. Kuhlman Car Company. These cars are powerfully constructed to suit them to heavy loads and fast service. As will



EXPRESS CARS FOR FAIRMONT & CLARKSBURG TRACTION COMPANY. A well designed car for fast and heavy service

be seen in the accompanying photographs, the cars have plain arch roofs, with car-line finish and wide sliding doors on each side at the center. Two hinged doors are provided at each end; the one at the right of the motorman closes against the corner post, while the other forms a part of the end and is intended for admitting long pieces of material. A partition,



EXPRESS CARS FOR FAIRMONT & CLARKSBURG TRACTION COMPANY. Long pieces of material are admitted through doors in the ends

composed of wooden slats, is provided at the back of the motorman at each end of the car. The car is well lighted with three windows at each side, in addition to the lights in the upper parts of the sliding and swing doors. Double basket racks are conveniently placed at the side of each sliding door to receive small and light packages.

Length of body	39 ft. 10 in.	From sills over trolley board	8 ft. 5½ in.
Length over bumpers	45 ft. 6 in.	Type of trucks	Brill No. 27-E2
Width over sills	8 ft. 6 in.	Type of motors	4—West. 304
Extreme width	8 ft. 8 in.	Wt. of car body less elec. equip.	19,420 lbs.
From track to sills	3 ft. 2 in.	Wt. of trucks	23,260 lbs.

SINGLE-TRUCK SEMI-CONVERTIBLE CARS FOR MADISON, WIS.

STRAIGHT SIDE CONSTRUCTION

THE American Car Company has recently delivered to the Southern Wisconsin Railway Company, of Madison, four single-truck cars of the Brill semi-convertible type. These cars have the usual dimensions and features of this type, except that the sides are straight instead of curved, the platforms are a trifle longer and the cars are wider than usual. The cars were needed to take care of the increasing traffic, which has called for 13 cars in the regular service and 5 additional for the extra service during rush hours. There is heavy riding at noon as well as at morning and night. On special occasions as many as 30 cars are put on the lines. The system comprises 14 miles of track, with grades as severe as 7 per cent. in some cases. One of the chief difficulties of street railway operation at Madison is the number of railroad crossings. These cause frequent delays and are a constant menace



SINGLE-TRUCK SEMI-CONVERTIBLE CARS FOR MADISON, WIS. There being no restrictions as to width, the cars were made 8 ft. 8 ins. over the posts and the sides of straight construction



SINGLE-TRUCK SEMI-CONVERTIBLE CARS FOR MADISON, WIS. Note the extra wide aisle and the excellent location of the lamps over the center of the seats

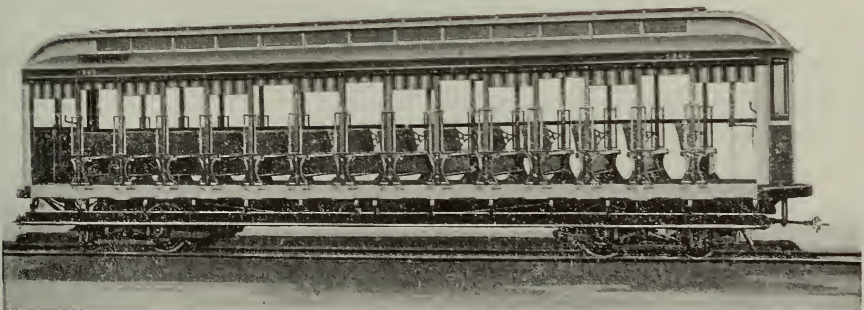
to the safety of the riding public, for no matter how well guarded, the danger of accidents is always more or less imminent. The streets are wide, allowing the cars to have an extreme width of 8 ft. 11 in., and the shortest curve radius is 45 feet. Fare collection is by the usual method. The charge is 5 cents for adults and children 3 cents. Tickets are furnished which are only for convenience as far as adults are concerned, as there is no discount; but for children the tickets are 2½ cents instead of cash fare of 3 cents. Universal transfers are issued for continuous trips.

Length of body	20 ft. 8 in.	From floor to headlining . . .	8 ft. 5½ in.
Length over platforms . . .	31 ft. 2 in.	From track to step	14½ in.
Length of platforms	5 ft. 3 in.	From step to platform	13 in.
Centers of side posts	29 in.	From platform to car floor . .	10 in.
Width over sills	8 ft. 8 in.	Seating capacity	32
Width over posts	8 ft. 8 in.	Type of trucks	Brill No. 21-E.
Extreme width	8 ft. 11 in.	Type of motors	GE-88—2-20 h.p.
From track to sills	26⅝ in.	Wt. of car less elec. equip. . .	15,000 lbs.
From sills to trolley boards .	9 ft. 3¾ in.		

OPEN CARS FOR DANBURY, CONN.

NARRAGANSETT TYPE

THE Danbury & Bethel Street Railroad Company has just received cars of the type shown in the engraving from The J. G. Brill Company. These are the first cars of the Narragansett type to be ordered by the Danbury & Bethel Company, and are particularly suited to the conditions of this railway because of curves of unusually short radii and because of the fact that the excursion service calls for long open double-truck cars loading from the pavement. By mounting the cars on Brill 39-E single-motor trucks, the radiation of the driving wheels and motors is reduced and the car enabled to negotiate a curve as sharp as 23 feet radius. A distinct advantage of the Narragansett type is its narrow width for a double-step car. The width is but 7 ft. 9½ in. over the posts and the extreme width is only 8 ft. 4 in. with both running boards raised and 8 ft. 11½ in. with one running board raised and the other lowered. These cars are popular with the patrons of the roads wherever they are in operation because of their easy access and large capacity. The car



OPEN CARS FOR DANBURY, CONN. These are the first cars of the Narragansett type to be mounted on single-motor trucks. The arrangement permits a 42-ft. car to negotiate a curve of 23-ft. radius

illustrated accommodates 70 seated passengers or 5 to each seat. The curtains can be drawn entirely to the floor, and, with the vestibule ends, give complete protection in case of stormy weather.

Length over corner posts	32 ft. 8¾ in.	Height track to top step tread	20 in.
Length over platforms	41 ft. 8¾ in.	Height step tread to platform	15¾ in.
Length front platform	4 ft. 6 in.	Seating capacity	70
Length rear platform	4 ft. 6 in.	Type trucks	39-E1
Centers of side posts	2 ft. 6 in.	Type motors	G. E. 1200-2—45 h. p.
Width over sills including angles	7 ft. 9½ in.	Weight of car body, less electrical equipment	14,000 lbs.
Width over posts at belt	7 ft. 11 in.	Weight of electrical equipment	2,000 lbs.
Extreme width	8 ft. 4 in.	Weight air brakes	2,000 lbs.
Height track to under side of side sills	2 ft. 10¾ in.	Weight trucks	10,050 lbs.
Height under side of side sills over trolley boards	9 ft. 2¾ in.	Weight motors	5,948 lbs.
Height floor to center head-lining	8 ft. 2¾ in.	Total weight	33,998 lbs
Height platform to car floor	7¼ in.		



SEMI-CONVERTIBLE P-A-Y-E CARS FOR BENTON HARBOR, MICH.

INITIAL PREPAYMENT EQUIPMENT

BENTON HARBOR is in the extreme southwestern part of Michigan, about 1½ miles from Lake Michigan, with which it is connected by a ship canal. It is the center of a great fruit region, and being but 60 miles from Chicago, on the Pere Marquette Railroad, a ready and easily accessible market is found for its products. Canning and pickling of the fruits which grow so abundantly in this region and the manufacture of fruit baskets and of furniture are among the leading industries of Benton Harbor. Numer-

ous mineral springs in and about the city furnish excellent water, which is bottled and shipped in large quantities. The spirit of progressiveness is evidenced very strongly in the many industries of Benton Harbor, and this is particularly true with reference to its electric railway system, owned and operated by the Benton Harbor-St. Joe Railway & Light Company. Current is obtained from the Berrien Springs Power & Electric Company and is transformed and distributed at the power station located in St. Joseph for the railway and commercial purposes. This system operates about 40 miles of track, standard gauge, and has 24 cars. Four Brill semi-convertible cars with 20 ft. 8 in. bodies and P-A-Y-E platforms have recently been received from the Danville Car Company. The seats are of the transverse type, six on each side of the aisle, giving a seating capacity of 24. The doors which close the entrance and exit are hinged to a wooden upright from which extends the P-A-Y-E railing and the front exit is provided with a sliding door. The steps at front and rear are of the stationary type. The window guards are composed of seven bars to give ample protection against accidents which might occur on account of the extra low window sill incident to this type of car. The cars are equipped



SEMI-CONVERTIBLE P-A-Y-E CARS FOR BENTON HARBOR, MICH. The doors at the entrance and rear exit are hinged to a center post. The front exit is closed by a sliding door

with vertical bronze brake wheels, track scrapers, sand boxes and other specialties of Brill manufacture. The trucks are of the same company's No. 21-E type and have a wheel base of 8 ft.; wheel diameter, 33 in.; journal boxes, $3\frac{3}{4}$ in. x 6 in.

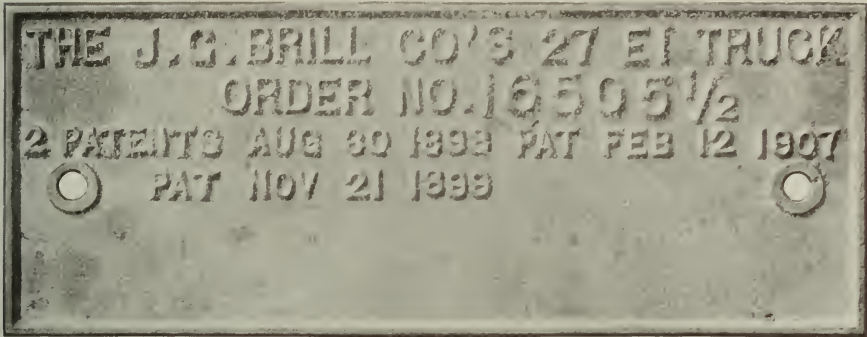
Length over corner posts	20 ft. 8 in.	From track to step tread	13 $\frac{7}{8}$ in.
Length over platforms (vest.)	31 ft. 8 in.	From step tread to platform	13 in.
Length of front platform	5 ft. 6 in.	From platform to car floor	7 $\frac{1}{8}$ in.
Length of rear platform	5 ft. 6 in.	Seating capacity	24
Centers of side posts	29 in.	Type of truck	Brill 21-E
Width over sills	7 ft. 9 $\frac{1}{2}$ in.	Type of motors	GE 80-2—40 h.p.
Width over posts	8 ft. 2 in.	Wt. of car body	13,110 lbs.
Extreme width	8 ft. 5 $\frac{1}{4}$ in.	Wt. of electrical equipment	940 lbs.
Height track to sills	30 $\frac{7}{8}$ in.	Wt. of truck	5,850 lbs.
Height over trolley boards	9 ft. 3 $\frac{3}{4}$ in.	Wt. of motors	5,600 lbs.
Height floor to head lining	8 ft. 6 $\frac{1}{2}$ in.	Total weight	25,500 lbs.



SUPPLEMENTS TO BRILL MAGAZINE

TRUCK AND CAR CHARTS

THE chart of the Brill No. 39-E truck, with names of parts, which accompanies this issue, will be followed each month by similar charts of other Brill trucks, and these will be continued by a series of city and interurban car charts. In making this announcement, the opportunity is taken to repeat the request that users of Brill trucks will facilitate the filling of orders for parts by giving the type and number of the truck for which parts are required and the factory order number. Both of these points can be ascertained with absolute surety by examining the patent plate secured to the side frame of each truck and on which is cast the type and factory order numbers, as shown in the illustration. The



A plate similar of the above type is fixed to the side-frame of every truck. The manufacturer's order number and the truck type number which it gives should be mentioned in every order for parts

only other requirement is that the correct name and quantity of the part needed shall be given in the order.

The Brill Order Guide No. 165, which has served for several years and of which four thousand copies have been distributed, will soon be superseded by a much more complete and extensive publication now in course of preparation.



TEST OF THE BRILL HALF-BALL HANGER BY THE PHILADELPHIA RAPID TRANSIT COMPANY

A BRAKE hanger of the Half-Ball type was tested at the 8th and Dauphin Streets shops of the Philadelphia Rapid Transit Company about the first of March, to determine the action of the hanger under various loads and the amount of load necessary to break the hanger.

In this test a weight of 5000 lbs. was first applied. This produced a slight deflection of the springs. A further deflection of the springs occurred when the weight was

increased to 10,000 lbs. Beyond this, and up to 35,000 lbs., there was no further deflection on the springs on the end of the hangers, showing that at 10,000 lbs. the usual play between the coils of the springs had been absorbed in the slight increase of space between the hangers. Any further load had no tendency to distort the hanger or fitted parts, thus insuring the integrity of parts and a return of the hangers to their proper positions when the load was removed.

After 35,000 lbs. load had been applied, it was requested by the Brill representatives that the test be stopped at this point to allow a photograph to be made of the hangers for BRILL MAGAZINE.

It is estimated that 10,000 lbs. is about the maximum strain that would be brought on each hanger during service, the usual strain being about 5,000 lbs. The hanger tested is of a type suited to the Brill 27-G truck, the standard truck of the Philadelphia Rapid Transit system.

The Half-Ball Brake Hanger was patented and adopted by The J. G. Brill Company as its standard hanger about two years ago and has been completely successful on all of the railway systems on which it has been in operation.



This Half-Ball Brake Hanger was subjected to a pull of 35,000 lbs. The usual pull is about 5,000 lbs., and the maximum, 10,000

MANUFACTURER'S INSPECTION AND TEST OF TRUCKS

ECONOMY is, and always has been, of paramount importance for the successful maintenance of any business, and in no line of endeavor is this more urgently necessary than in that of passenger transportation by electric power as exemplified by urban and interurban lines. In such service the stops are quite frequent and the curves often are numerous and of comparative short radius, so that, even if the roadbed can be kept in good condition, the braking and inertia stresses subject the rolling stock to many and various cross stresses in addition to the static stresses due to the load alone; so it is evident that economy of maintenance of rolling stock, as well as economy of power consumption, will be a maximum for a rolling stock construction possessing the inherent strength to best resist the continual destructive effect of these many stresses encountered in operation and a construction which will continue to do so for the longest time without deterioration. Whether each transportation unit is self-propelled or is one of a train drawn by a motor unit, but more especially in the case of separate self-propelled units, which are increasing in size, weight and speed, the major portion of the destructive effects of the heavy stresses is borne by the trucks which carry the car body and its load, and in the case of motor units these trucks also must resist the power stresses of the motors. Experience has demonstrated that riveted and built-up truck frames soon rack loose under the constant pounding and twisting of the severe stresses engendered in service and, when any looseness or wearing of the parts occurs, as does happen with riveted and built-up frames, the truck will work out of "square," and when this occurs the axles then lose their parallel relation; the alignment of the motors is destroyed; the journal boxes lose their freedom of move-

ment in the jaws of the pedestals; the proper set of the journal bearings is disturbed, resulting in hot boxes, heated motor bearings, dangerous temperature rises in the motor, tendency of the wheels to "climb" and thereby cause derailment; and a train of evils which not only cause a rapid and large deterioration of the truck and motors but a great and unnecessary amount of power consumption. In the design and construction of truck frames to resist such deterioration as has been mentioned as occurring when proper means have not been taken to meet the destructive effects of the severe stresses, The J. G. Brill Company has standardized the various types of trucks manufactured by them, and each type has been so designed and constructed as to best meet the various conditions of service to which it will apply; and these designs and methods of construction have been arrived at by long experience and careful calculation of each part, both as to the adaptability and strength of the part for its proportion of the total stress, and also its relation to the frame as a whole, so as to maintain the integrity and "squareness" of the complete truck under the most severe test of service. In this connection we will speak of the solid forged or cast side frames which are rigidly connected with the transoms by forged corner brackets and flanged gusset plates, by means of tapered bolt connection through drilled and reamed holes, with faced surfaces under bolt heads and nuts; curving of ends of frames around wheels to afford large bolting surface for end angles, which are also secured by tapered bolts drilled and reamed with faced surfaces under bolt heads and nuts; also the pedestal faces are machined square to the center line and parallel to one another. When the main frame is assembled as above, the wheel base centers of pedestals are carefully gauged with steel trammels and the perpendicular distance between frame centers carefully gauged in the same manner, then the distance between diagonal pedestal centers checked in the same careful manner and the truck frame is then known to be absolutely

"square" and, moreover, the substantial methods of construction before mentioned preclude its getting "out of square," either from the thrust of the leading wheel on curves or from other cross stresses encountered in actual service. Each separate spring entering into the spring series of any particular type of truck is proportioned for the load it will carry, depending upon the condition of loading, and is separately tested for deflection under the predetermined loads by hydraulic testing machines of the most modern description before being assembled in the truck frame. The brake rigging and other parts going to make up the whole equipment of the truck, including the bolster, are carefully inspected and assembled under the supervision of an expert inspection force, and the complete assembled truck is then run upon a testing stand and, by hydraulic power, subjected to a load equivalent to the total load which the truck will carry—including a proper reserve as a safety factor—and the load is then decreased to the equivalent of that of the light car body, when the height from the rails over the pivot plate is measured and made to correspond to that specified; and each and every moving part is carefully examined for assurance of its proper functioning and freedom of movement. When the wheels and axles are furnished by this company, the axle material must meet stringent specifications as to chemical and physical tests and it is then machined as specified and all finished work accurately gauged with micrometer gauges. All wheels are first carefully inspected for surface flaws and then accurately centered and bored, with due allowance made for a press fit upon the axles; then they are placed upon the axles and carefully pressed to the specified gauge in a hydraulic wheel press; after which, except with rolled steel or steel tired wheels, they are accurately ground to true circles in wet wheel grinders. In conclusion, attention is directed to the policy of this manufacturing company in maintaining an efficient inspection force whose duties are to carefully inspect and check

the manufacturing and structural details of the trucks, and thereby assure a practical achievement of the theoretical engineering efficiency of all trucks designed and built by this company.



A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

III

THESE reminiscences of the "res angustæ domi," the "narrow matters of home," are interesting to the writer and those immediately concerned. They were events and developments in an enterprise which started with small beginnings and has grown, a brick at a time, to proportions of some considerable magnitude.

The development of electricity as a motive power for railway cars set in, after the first experiments, with a vigor rarely exemplified in the using of Nature's forces; in fact, it marked a distinct epoch in the world's history. Somewhat strangely, it was not in the big cities of the United States that electric propulsion was first employed. In



Car for one of the earliest storage battery systems

point of fact, there was an installation earlier than Leo Daft's, before referred to, which was promoted by the National Electric Railway System, and another for Ansonia,

Conn. In the same year, 1887, one for Sprague for Harrisburg, and one for the same person for Baltimore. In 1888 and 1889 cars were furnished to the Sprague



The first electric car built at the Brill works was furnished in the latter part of 1886 to the Scranton Suburban Railway

Electric Company for Atlantic City; The Electric Accumulator Company, Philadelphia; Sprague Electric Company for Wichita, Kan.; Evansville, Ind.; Eau Claire, Wis., Sprague System; Marlborough, Mass., Sprague System; Thomson-Houston Electric Company, Davenport; Sprague System, Davenport, Iowa; experimental car for Thomas A. Edison, Menlo Park, N. J.; Electro-Dynamic Company of Philadelphia, the predecessors of The Electric Storage Battery Company; Cleveland, Ohio, Thomson-Houston System; Quincy & Boston Street Railway; Kearney, Neb., Sprague System; Eckington & Soldiers' Home Railway, Washington, D. C.; Tacoma, Wash., Sprague System; Stillwater, Sprague System; Ogden, Utah; storage battery car for Electric Car Company of America; Ensley, Ala.; Binghamton, N. Y., Sprague System; Wilkes-Barre, Pa., Sprague System; West Bay City, Sprague System; Wilmington, Del.; Portland, Ore.; Pitts-



A Van Depoele motor car for Ansonia, Conn.

burgh, Sprague System; Dubuque, Iowa, Sprague System; Cleveland, Ohio, Sprague System; Tampa, Fla.; Chattanooga, Tenn.; Laredo, Texas, Sprague System; Barclay,

Sprague System; Durban, Africa; Denver, Col.; Pullman, Ill., Sprague System; Neversink Mountain Railway, Reading; Newburgh, N. Y.; Washington, Alexandria & Potomac Railway; and Sioux City Railroad. At this time a considerable order for cars for steam traction was furnished to Bogota, Colombia, the first railroad cars for that country, and a large order for the Mexican Transcontinental Line for the Ferrocarril Interoceanico was furnished, and a large order for Atlanta, Ga., Thomson-Houston System; another for Americus, Ga., Thomson-Houston System; and another for Saratoga, N. Y.

In 1889, a year of great floods, including the Johnstown flood, the expansion of the business impelled the Brill Company to move their works to larger surroundings. A tract of 37 acres had been secured at Bridesburg, Philadelphia, but it was deemed a disadvantage to be located at a place having but one transporting railway system, and accordingly a tract of 18 acres at the intersection of the Pennsylvania and the Baltimore & Ohio Railroads was secured and work immediately begun in building the shops of the present plant in the southwest part of Philadelphia. This work was energetically prosecuted, and in the spring of 1890 the moving of the machinery was begun. The workmen would work on a machine at the old plant up to noon of one day and the machine

would be taken down, conveyed to the new location, three miles distant, set up and be working again on the next day. The pressure for cars and trucks to be supplied was great. [TO BE CONTINUED]



Closed cars for Scranton, Pa. Van Depoele motor on the front platform

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

**American
Car Company**
St. Louis, Mo.

**G. C. Kuhlman
Car Company**
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

**Wason
Manufacturing Company**
Springfield, Mass.

**Danville
Car Company**
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Mexico

International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Italy

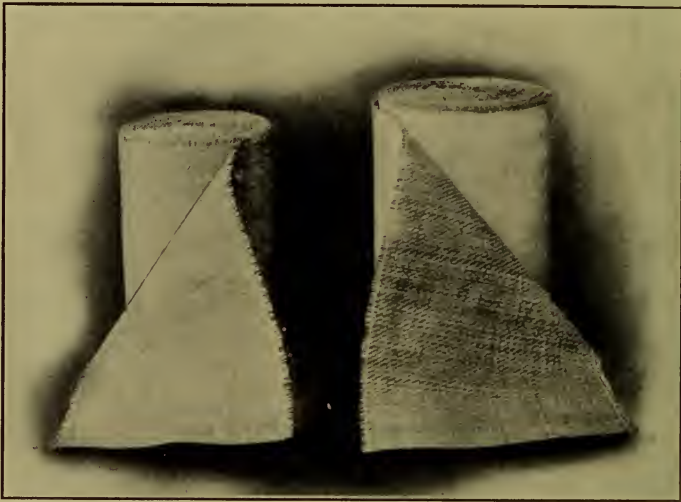
Giovanni Checchetti
Piazza Sicilia, 1
Milan

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai



BRILL TWILL-WOVEN CANE

Canvas-lined woven cane for seat cushions and unlined woven cane for seat backs are made in all widths from 18 to 36 inches, even inches. The superior wearing qualities of Brill woven cane are due to the kind of cane used and to the improvements in looms and processes developed and perfected at the Brill plant. The cane used is selected for its hard silicate surface which doubles the life of the material over that made with ordinary cane

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

Vol. V

APRIL, 1911

No. 4

BRILL MAGAZINE



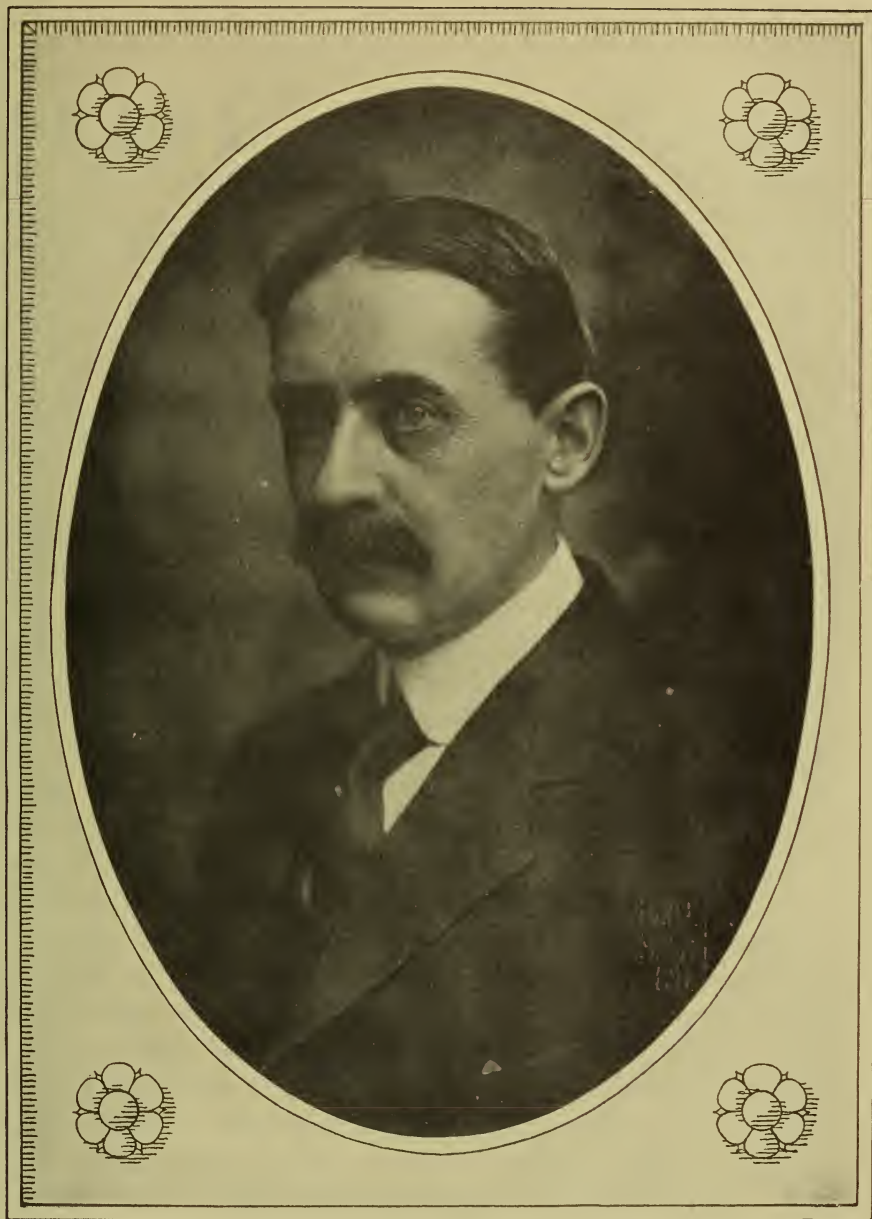
Brooklyn Bridge



FUNERAL CARS

The illustration is of the pallbearers' compartment of funeral cars furnished last year to the Chicago City Railway Company. The casket is carried in the enclosure at the left and is received therein through a full-length door on the outside of the car. This compartment can be arranged to have the casket rest in the center and have seats along both sides. Funeral cars for first, second and third-class service, operated with and without trail cars, are used in increasing numbers in the larger cities at home and abroad and, where the cemeteries are at a distance, are a boon to the public and a considerable source of income to the railway company.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



W. Blake

EDITOR ELECTRIC RAILWAY JOURNAL

BRILL MAGAZINE

Vol. V

APRIL, 1911

No. 4

HENRY W. BLAKE

[WITH PORTRAIT INSERT]

HENRY W. BLAKE has been the editor of the *Electric Railway Journal* and of its predecessor, the *Street Railway Journal*, since 1894, and has been connected with the editorial department of this paper since January, 1891. The intervening years constitute the era of development of the modern electric railway. Early in this period the *Street Railway Journal* adopted a strong editorial policy, and by its industry in the collection of all of the facts, engineering, financial and corporate, relating to the new motive power, and by its constructive suggestions it soon became the recognized authority in this country and Europe, on all topics connected with city and interurban transportation. Moreover, as it was an earnest advocate from the first of the use of electricity as a motive power for these railways, it contributed an important part to the electric railway development of the past twenty years. Mr. Blake is a graduate of Yale in the class of 1886, and subsequently took a course in electrical engineering at the Massachusetts Institute of Technology. In 1888 he entered the employ of the Sprague Electric Railway & Motor Co., which was then engaged in equipping electric railways, and remained with that company and its successor, the Edison General Electric Co., until 1891. In the latter year he became associate editor of the *Street Railway Journal*. Mr. Blake has traveled extensively in this country and abroad. He is a member of a number of the principal engineering and railway associations and clubs in this country, and also of the Union Internationale de Tramways et de Chemins de Fer d'Intérêt Local, in Europe.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

BROOKLYN*

THE Borough of Brooklyn, City of New York, has a combination of street railway conditions distinctly its own. The development has been of the radiating order, with the center at a point opposite the lower end of Manhattan. In other cities of similar plan and development, the convergence is to a business center, but as the preponderance of traffic is via the Brooklyn Bridge, the concentration is at that point, with the complication of the lines carrying the heaviest traffic traversing the principal business thoroughfares. In addition to this, the situation is aggravated by the going and coming of the hordes of workers in the factories, warehouses and wharves which line the Brooklyn water front, at the same hours as the swarms of humanity which fill to overflowing the bridges, tunnels and ferries to Manhattan. It is this question of transporting both Manhattan and Brooklyn crowds without conflict that is the chief traffic problem. For many years the traction companies were utterly unable to furnish adequate transportation facilities, because the Brooklyn Bridge and its Manhattan terminus had long before reached their physical limitations. Brooklyn Bridge was opened in 1883, and for twenty years was the only means of communication by rail between Brooklyn and Manhattan. It was not till 1898 that the surface cars were permitted to cross the bridge and later in the same year elevated cars commenced to cross except during rush hours. The number and capacity of the ferries had not increased in that time, and with the increase in population from 600,000 in 1880 to 1,200,000 in 1900, it can be readily understood that the congestion at the bridge ter-

* The twenty-eighth article of this series.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Map of the Brooklyn Rapid Transit System. The circles with Figs. 1, 2 and 3 designate the points shown in the photographs. Fig. 1, front cover. Fig. 2, page 96. Fig. 3, page 97.

minals and in the narrow streets near the Brooklyn entrance had nearly reached a stage of strangulation when the second bridge was opened in 1904. This bridge, known as the Williamsburg Bridge, has a surface and elevated car capacity greater than the Brooklyn Bridge and therefore the tremendous pressure on the former systems was at once relieved and the traction companies were enabled to provide sufficient cars to adequately handle the rush hour traffic and to arrange a satisfactory routing system. In 1908 the Interborough Rapid Transit Tunnel was opened, furnishing through transportation between the center of Brooklyn and all points on the Manhattan subway system. The two bridges and the tunnel are sufficient for the present traffic, and the Manhattan Bridge now under construction will have still greater capacity than the Williamsburg Bridge and will meet the expansion of the next few years. The population of the Borough of Brooklyn according to 1910 census was 1,634,351.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Loop around Borough Hall for cars which do not cross Brooklyn Bridge. At the left is the intersection of five of the busiest thoroughfares. The elevated structure is on Fulton Street which traverses the shopping district. Large office buildings surround the other sides of this triangle. This point is indicated by Fig. 2 on the map.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Brooklyn end of the Williamsburg Bridge. Most of the lines of the eastern section of the system converge at this plaza and the greater part of the cars cross the Bridge. This point is indicated by Fig. 3 on the map.

With the exception of 49 miles of track of the Coney Island & Brooklyn Railroad and 3 miles of the Van Brunt Street & Erie Basin Railroad, the lines of the Brooklyn Rapid Transit comprise the entire surface and elevated trackage of the Borough, totaling 535 miles for the surface system and 71 miles for the elevated. During last summer, from May 1st to October 1st, a total of 1953 cars maintained were as follows : 452 convertibles, 554 semi-convertibles, 28 standard double-truck closed, 750 double-truck open and 169 single-truck open. During the summer a large number of cars were withheld from service, excepting on special days when the traffic was extremely heavy, as it is the practice to operate the open and lighter equipment in preference to the semi-convertible cars. The schedule of cars maintained for the current winter season, October 1st to May 1st, totals 1644 and is as follows :

452 convertibles, 554 semi-convertibles, 535 standard double-truck closed and 103 single-truck closed.

With the exception of a few short sections, the lines are all double-tracked and radiate from the two bridges to all parts of the Borough of Brooklyn and to various parts of the Borough of Queens. The addition of three-quarters of a million



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Standard closed car of the Brooklyn Rapid Transit System. Length of body, 28 ft. Length over vestibules, 38 ft. 3¼ in. Width over sills, 7 ft. Width over posts at belt, 7 ft. 9 in. Operated with two 60-h. p. motors. The cars are equipped with extending fenders and wheel guards; the fender is not shown in the photograph.

to the population of these two boroughs during the last ten years has called for long extensions to the principal lines which penetrate the outlying districts, as most of the population has established itself beyond a semicircle three miles distant from and centering at the Brooklyn end of the Brooklyn Bridge. The lines running to Coney Island and other points on the southern shore are about ten miles long, and three of

the lines which extend into the center of Queens are still longer. The radiation from the two bridges, which are $1\frac{1}{2}$ miles apart, and running in the same general direction, forms crosstown lines and therefore the mileage for the population is low in comparison to other cities of the radiating plan which require a system of cross lines. The system has the



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of car shown on opposite page. The longitudinal seats and accelerator doors enable these cars to load rapidly and therefore they are desirable for rush hour and Coney Island service. Seating capacity, 38. The window sashes drop into covered pockets. Single lights are placed along the rail over the windows and a row along the center of the dome.

advantage of furnishing the larger part of the transportation to Coney Island and other resorts by direct routes from the bridges and by other routes from various parts of the Borough during a six months' season and thereby furnishing a means of developing large sections along these routes without the usual attending loss to the railway company. The three great cemeteries reached by the lines are the largest in the



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Standard double-track open car of the Brooklyn Rapid Transit System. Thirteen benches, capacity 65.

five boroughs, and together with parks and club grounds, also have the same effect of economical traffic development in the outlying districts. The greatest expansion in the future of the City of New York must continue to be in these two boroughs because of their proximity to the business section of Manhattan, their accessibility, ample area and topography. Manhattan has an area of but 22 square miles and the Borough of the Bronx but 40, while Brooklyn has 77 and Queens 130.

Coincident with the opening of the Williamsburg Bridge and the rerouting of the entire system, the company instituted a thorough reorganization of every department and rehabilitation of all properties. The power service was insufficient to maintain the schedules and necessary additions to rolling stock could not be made nor could the electrification of the elevated division be completed; buildings were required to house the track and line departments and the facilities for storage and maintenance were totally inadequate; the diversity of types of car bodies, trucks and electrical equipments made it apparent that the task of standardization would be

difficult and expensive. The cost grew to \$40,000,000 in the five or six years required for its accomplishment.

The new order of things has been in existence for several years and has resulted most favorably in every direction. The rolling stock, which relates most closely to the comfort and convenience of the public, has received the necessary additions and the cars are maintained in a clean, comfortable and attractive condition, free from breakdowns. The improved equipment and service has reduced accident charges and produced economies in all directions. The last annual report reveals remarkable financial results of operation under the changed conditions. Every year from 1902 has shown an increase in passenger earnings, aggregating 66.2 per cent. for the entire system, of which percentage 36.4 was furnished by the surface division. The costs for damages for the entire system amounted to 6.88 per cent. of operating earnings in 1902; last year this expense was but 2.66 of the total operating earnings. The proportion of general operating expense—not including repairs, replacements, damages and legal expense—to operating earnings, was 35.52 per cent. last year as against 42.85 per cent. in 1902; the total operating ratio has been likewise gradually reduced from 65.41 in 1902 to 56.09 last year.



INTERURBAN CARS FOR UNITED RAILWAYS SYSTEM OF PORTLAND, ORE.

PASSENGER AND COMBINATION TYPES

EARLY in 1909 the American Car Company delivered the first cars operated on the new line of the United Railways System running west from Portland to Hillsboro and Forest Grove. These have been lately supplemented by similar cars built by The J. G. Brill Company. This line is



INTERURBAN CARS FOR UNITED RAILWAYS SYSTEM OF PORTLAND, ORE. Sixty-six passenger cars for trolley operation on fast schedules either singly or in trains. Doors in the center of the vestibules provide communication between cars.

27½ miles long and traverses the populous suburban district north of Portland along the bluffs on the west side of the Willamette River to its confluence with the Columbia River and continues for fourteen miles along the Columbia through a number of towns to Burlington, where it turns in a westerly direction and serves the towns which are at frequent intervals for another fourteen miles, till Forest Grove is reached. The company also has ten miles of track within the city of Portland which serves as an entrance for the interurban system, and also as a track connection for steam and electric freight lines. Another section of the system is under construction which runs south of the city. The country through which the lines pass has rich soil and is largely under cultivation, and there is much



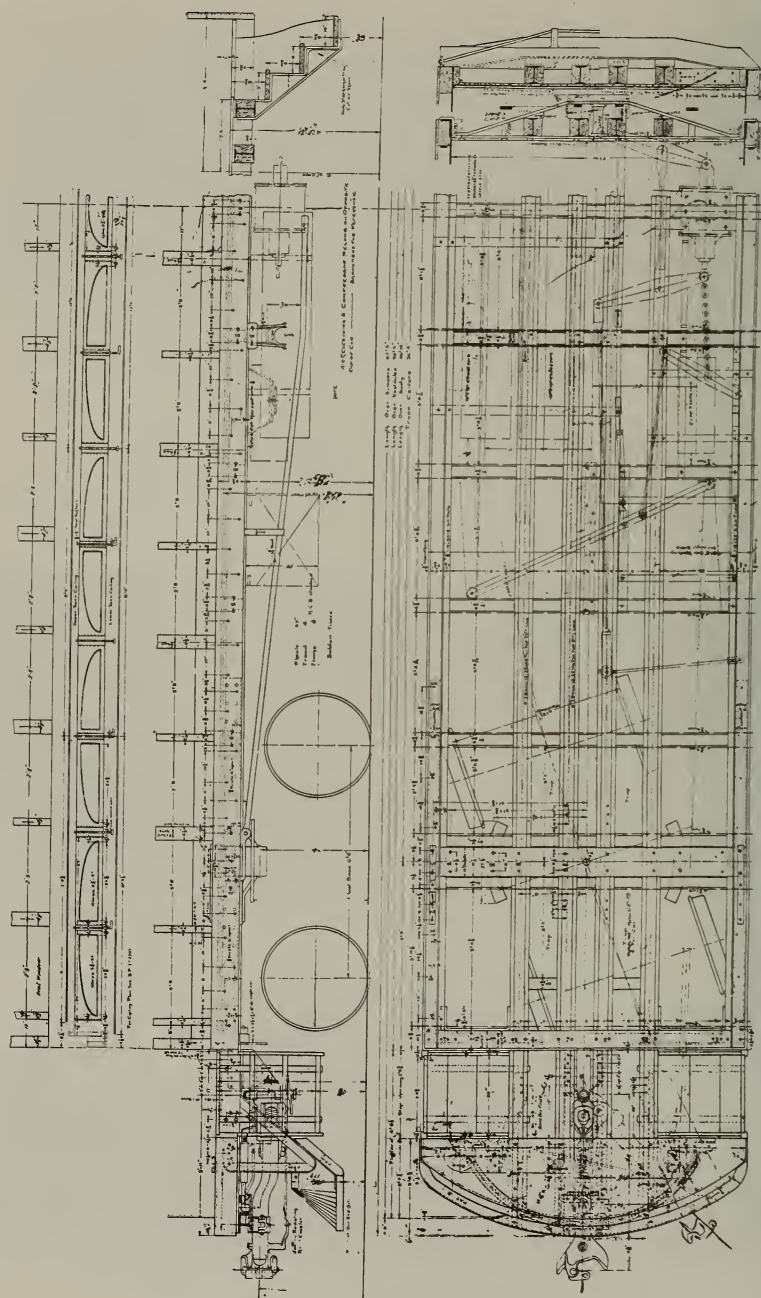
INTERURBAN CARS FOR UNITED RAILWAYS SYSTEM OF PORTLAND, ORE. The front platform is arranged as a motorman's compartment, as this type is for single-end operation.

valuable timber land throughout the district. The lines handle a comparatively large amount of heavy freight, chiefly at night, and excellent terminal facilities have been provided.

The new cars are of straight passenger and combination passenger, smoking and baggage types. Both types have the same general dimensions and the underframes are practically identical. Both are motor types equipped with M. C. B. couplers and air brake connections, and are arranged for single end operation. The straight passenger type has a hinged door at the entrance to the vestibules which swings back against the end of the car. The step opening between the door and the platform is fitted with a Pullman type of hinged trap. A swing door with 25-in. opening is at the center of the vestibule to permit passage between cars. The front vestibule of the



INTERURBAN CARS FOR UNITED RAILWAYS SYSTEM OF PORTLAND, ORE. The upper sashes are stationary and the lower sashes raise full height. The seats are Brill "Winner" type with 38-in. cushions and 24-in. backs.



INTERURBAN CARS FOR UNITED RAILWAYS SYSTEM OF PORTLAND, ORE. Bottom and side framing of passenger and combination cars.



INTERURBAN CARS FOR UNITED RAILWAYS SYSTEM OF PORTLAND, ORE. The passenger compartment seats 34, the smoking compartment 16, and two folding seats in the baggage compartment accommodate 10. The interior of these cars is finished in quartered oak.

combination type is arranged for a motorman's compartment and has no door at the center. The baggage compartment is furnished with cherry slat seats which fold against the walls; a 40-in. sliding door is provided at both sides. The compartments have hardwood partitions, and both types of cars are finished in golden oak, with headlinings, doors and sashes of the same.

Length of body, combination type 51 ft. 6½ in.
 Length of body, pass. type 46 ft. 10 in.
 Length over platforms 56 ft. 3 in.
 Length of platforms 4 ft. 8½ in.
 Length of baggage comp't 11 ft. 0 in.
 Length of smoking comp't 10 ft. 8½ in.
 Length of motorman's compartment 4 ft. 4¾ in.
 Centers of side posts 2 ft. 8 in.
 Width over sills 8 ft. 8 in.
 Width over posts 8 ft. 8 in.
 Extreme width 8 ft. 10⅞ in.

From track to sills 3 ft. 6¾ in.
 From sills over trolley boards 9 ft. 6⅜ in.
 From floor to headlining 8 ft. 9 in.
 From track to step 17⅜ in.
 From step to plat., 3 steps each 10¾ in.
 Seating capacity, combination type 60
 Seating capacity, pass. type 66
 Motors G. E. 73, 4-75 h. p.
 Wt. of car body, less elec. equip., comb'n type 62,100 lbs.
 Wt. of car body, less elec. equip., passenger type 61,600 lbs.

HANDSOME CARS FOR THE MICHIGAN UNITED RAILWAYS

PREPAYMENT TYPE

THIRTY cars of the interesting type shown in the illustrations were recently delivered to the Michigan United Railways Company by The J. G. Brill Company, and have been put in commission on the lines at Jackson. The Michigan United Railways Company owns and operates the street railway systems of Jackson, Lansing, Kalamazoo and Battle Creek and the interurban lines between these cities of southern Michigan, about 225 miles of track in all.

The large windows are the principal feature which distinguishes these cars from the usual city types, and, while not novel, cars of this window arrangement are rarely seen. Cars of the same general style have been in operation in Jackson for several years. A striking appearance has been gained also by the rich effect of the selected mahogany with which the interiors are entirely finished, ceilings included. The platforms are 6 ft. long and are dropped 9 in. below the car floor. They are supported on heavy birch knees, the outside knees



HANDSOME CARS FOR MICHIGAN UNITED RAILWAYS. The windows have 4-ft. 6-in. centers. Platforms, 6 ft. long. The car was photographed on temporary trucks.



HANDSOME CARS FOR MICHIGAN UNITED RAILWAYS. Selected mahogany is used for the interior finish and headlinings of these cars.

being 3x8-in. reinforced with 7x3½x½-in. angles and the inside knees 3x6½-in. reinforced by 4x3x½-in. angles. The vestibules, as will be seen in the engraving, are hexagonal in shape and have three single-drop sashes; the front of the vestibules is sheathed with No. 14 steel. Double folding doors, hinged to the vestibule corner posts, are arranged to be replaced with gates during the summer. The doors in the body ends are of the mutually-operating sliding type and made of mahogany. Mahogany is also used for the window sashes, the upper of which are stationary and the lower drop into covered pockets. Hand rails with straps extend only over the longitudinal seats at the car corners. These corner seats accommodate five passengers each, and therefore, with six transverse seats on each side of the aisle, and allowing for the heater at one corner, the seating capacity is 42.

The bottom framing consists of 4x7 $\frac{3}{4}$ -in. side sills with sub sills and a 12x $\frac{3}{8}$ -in. steel plate between, extending the full length of the car. The 3 $\frac{1}{2}$ x4 $\frac{1}{4}$ -in. stringers are reinforced with 4x3x $\frac{1}{2}$ -in. angles. The oak end sills are 5 $\frac{1}{4}$ x6 $\frac{7}{8}$ -in. and the four oak crossings are 3 $\frac{1}{2}$ x4 $\frac{1}{4}$ -in. Trap doors are provided for two motors of GE-80 type.

Length of body	28 ft. 0 in.	From sills over trolley boards	8 ft. 7 $\frac{7}{8}$ in.
Length over platforms	40 ft. 0 in.	From floor to headlining . .	7 ft. 7 $\frac{1}{2}$ in.
Length of platform	6 ft. 0 in.	From track to step	15 $\frac{5}{8}$ in.
Centers of side posts	4 ft. 5 $\frac{11}{16}$ in.	From step to platform	14 $\frac{1}{2}$ in.
Width over sills	8 ft. 0 in.	From platform to car floor . .	9 in.
Width over posts	8 ft. 2 $\frac{1}{2}$ in.	Seating capacity	42
Extreme width	8 ft. 5 $\frac{1}{4}$ in.	Wt. of car body with heater	16,440 lbs.
From track to sills	2 ft. 8 $\frac{1}{4}$ in.		



ONE-MAN PREPAYMENT CARS FOR SELMA, ALA.

FLUSH PLATFORMS

A NOVEL type of car was recently designed and built for the Selma Street & Suburban Railway by The J. G. Brill Company which should be of interest to operators of street railways in small cities and of suburban lines, where it is not necessary to have a speed of more than 20 miles an hour. While it costs less than the usual type with the same seating capacity, it does not look like a cheap car, for the design is along the familiar lines of a modern double-truck car. Now that the Brill plain arch roof has become known by railway men and its adoption becoming general, it no longer produces an odd effect by the simplicity of its lines, but instead looks distinctly modern, while the monitor style is beginning to look old-fashioned. However, it is not appearance, but practical advantages and better service that

count, and the Brill roof has demonstrated these. The flush platforms, with single doors for entrance and exit at diagonally opposite corners of the car, together with the absence of bulkhead, chiefly distinguish the plan. A simple lever contrivance operates the door and step simultaneously from a handle within reach of the motorman's left hand, and by closing the door and removing the handle the door is securely locked. The motorman can therefore control the situation as



ONE-MAN PREPAYMENT CARS FOR SELMA, ALA. Arranged for double-end operation, with a sliding door at diagonally opposite corners. The door and step are operated simultaneously by the motorman-conductor. An inexpensive type to build, operate and maintain. Mounted on Brill No. 21-E Truck.

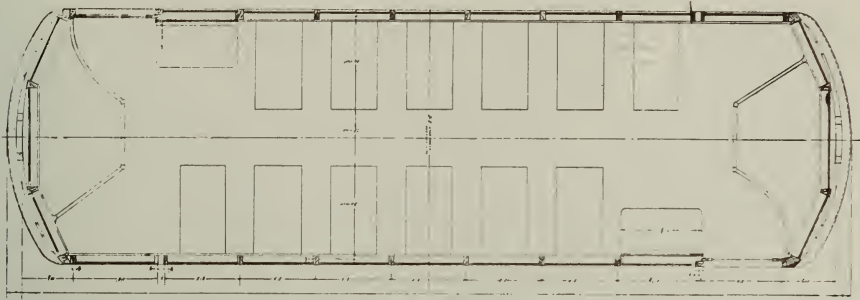
in the days of the "bob-tail" horse car, when the driver closed the rear door with a lever from his enclosed platform and could thus prevent a passenger from leaving till he had deposited his fare in a glass box. This "bob-tail" car, by the way, was introduced about 1865, and played an important part in the development of street railways, for at that time many lines were being operated at a loss with the larger cars in vogue, having a platform at each end and requiring both conductor and driver. The little one-horse car with its single door and step at the rear and one-man crew was an inexpensive and light equipment, economical in power and operation,

and made it possible to develop traffic at a profit instead of at a loss, and on large systems was used to provide a more frequent and quicker service. The one-man prepayment car, particularly the Selma type, will be seen therefore to be closely analogous to the "bob-tail" car, and with a fare box the analogy is complete.



ONE-MAN PREPAYMENT CARS FOR SELMA, ALA. The upper sashes raise into pockets and the lower sashes drop. The end sashes also drop, allowing a free rush of air through the car, if desired.

The Selma cars are constructed on a substantial under-frame composed of 4 by $4\frac{3}{4}$ -in. wheel pieces; 7 by $3\frac{1}{2}$ by $\frac{1}{2}$ -in. wheel piece angles; $3\frac{3}{8}$ by $4\frac{3}{4}$ -in. side sills; $3\frac{1}{2}$ by $4\frac{3}{4}$ -in. crossings with 4 by 3 by $\frac{1}{2}$ -in. angles at each crossing. The door openings are 2-ft. 6-in. wide and the windows centers are 2-ft. 5-ins. Double-sash windows of the Stephenson semi-convertible type leave the openings entirely clear, when desired, as the upper sashes slide up into pockets and the



ONE-MAN PREPAYMENT CARS FOR SELMA, ALA. The seating capacity is 28. There is space for a longitudinal double seat opposite the door at each end, if desired. Where lines are arranged for single-end operation of cars the seating capacity can be 40.

lower sashes drop into the side walls. All three end-sashes drop into pockets, and therefore when side and end windows are all open there is nothing to prevent a free current of air sweeping through, the same as in an open-sided summer car. The interiors are finished in ash with slat seats of the same and of the Brill "Winner" type. Brill No. 21-E trucks are used and have a wheel base of 7 ft. 6 in. and wheel diameter of 33 in.

Selma is located close to the center of the State of Alabama, 40 miles west of Montgomery, the capital, and 80 miles south of Birmingham, the metropolis, and is connected with both cities by direct railway routes. The lines of the Selma Street & Suburban Railway Company are $8\frac{1}{2}$ miles long, with 12 motor and 11 trail cars in operation. Heavy freight is handled over the lines at night. An amusement park owned by the railway company is the only attraction of the kind in the neighborhood and draws large crowds during the season.

The principal dimensions of the cars are as follows:

Length of body over vestibules	26 ft. 0 in.	Step tread to car floor	16 in.
Centers of side posts	2 ft. 5 in.	Seating capacity	28
Width over sills	8 ft. 2 in.	Type of truck	Brill 21-E
Width over posts	8 ft. 2 in.	Motors	West. 12-A—2-25 h.p.
Extreme width	8 ft. $5\frac{3}{8}$ in.	Weight of car body, less electrical equipment	9,140 lbs.
Height track to sills	2 ft. $7\frac{1}{8}$ in.	Wt. of trucks	5,360 lbs.
Height over trolley boards	8 ft. $9\frac{3}{8}$ in.	Wt. of motors	5,400 lbs.
Height floor to head lining	8 ft. $1\frac{3}{4}$ in.	Total weight	19,900 lbs.
Track to step tread	$18\frac{1}{2}$ in.		

COMBINATION CARS FOR ONTARIO, CAL. CALIFORNIA TYPE

THE car illustrated is of an order of three delivered a few weeks ago to the Ontario & San Antonio Heights Railroad Company of Ontario, Cal., by the G. C. Kuhlman Car Company. The railway line is about ten miles long and extends from Ontario to San Antonio Park, an amusement park owned by the company. Ontario is situated midway between the cities of Los Angeles and San Bernardino in the southern part of California on the Southern Pacific and the San Pedro, Los Angeles & Salt Lake Railroads. The line runs directly north from Ontario and crosses the Santa Fe main line at Upland, furnishing a means of connection between points on the three lines of steam roads which run parallel to each other, and continuing north to the park at the end of the route. This park contains 30 acres and adjoins the land on which the power plant is located. The line traverses a beautiful country with mountain ranges on all sides, and climbs the lower slopes of the San Gabriel Range to a height of 2200 ft. above sea level and 1200 ft. above Ontario.



COMBINATION CARS FOR ONTARIO, CAL. These are the first cars of the California type to be mounted on Brill No. 39-E single-motor trucks.



COMBINATION CARS FOR ONTARIO, CAL. This combination type has been popular in all parts of California and other parts of the Pacific Coast for many years. Seating capacity 40, 16 in the closed compartment.

The California type of car was originally used in San Francisco on the cable lines about thirty years ago and has been very popular on the coast ever since. The mild climate throughout the year, with prevailing clear weather and cool nights, calls for both open and closed cars; therefore by combining the two an ideal type is obtained, evidently suited to all the conditions, and wherever used the problem of light-weight cars is already solved.

These are the first of the California type to be mounted on Brill No. 39-E single-motor trucks and the advantage in a car of this length is apparent, as the truck centers are permitted to be farther apart and the body carried lower than if on trucks having all wheels of equal size. Again, this a light car body, and although the grades on the line are heavy, the two motors

of 65 h.p. each are ample for the service, and thus a completely efficient and at the same time economical equipment is provided.

Length of body	26 ft. 3 in.	From floor to headlining . .	8 ft. 0 $\frac{5}{8}$ in.
Length over platforms . .	37 ft. 2 in.	From track to step	12 $\frac{1}{2}$ in.
Length of front platform .	5 ft. 5 $\frac{1}{2}$ in.	From step to platform, 12 $\frac{1}{2}$ in. and 12 $\frac{1}{2}$ in.	
Length of rear platform . .	5 ft. 5 $\frac{1}{2}$ in.	Seating capacity	40
Centers of side posts . 32 $\frac{7}{8}$ in. and 29 $1\frac{3}{8}$ in.		Type of trucks	Brill 39-E
Width over sills	7 ft. 10 $\frac{1}{2}$ in.	Motors	GE-210—2-65 h.p.
Width over posts at belt . .	8 ft. 2 in.	Weight of car body with	
Extreme width	8 ft. 5 in.	electrical and air brake	
From track to sills	31 $1\frac{1}{8}$ in.	equipment, trucks and	
From sills over trolley boards	8 ft. 11 $\frac{1}{4}$ in.	motors	35,960 lbs.



PREPAYMENT CARS FOR CHATTANOOGA, TENN.

INITIAL EQUIPMENT

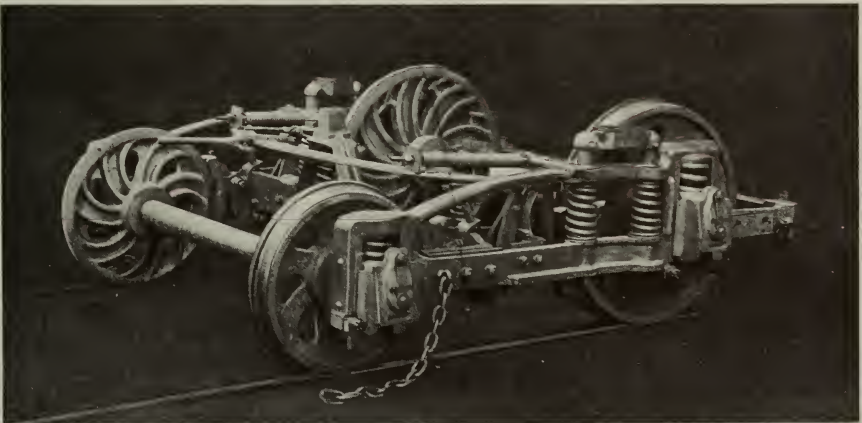
THE first ten cars of the P-A-Y-E type to be operated in Chattanooga were put on the lines a few weeks ago and were furnished by the G. C. Kuhlman Car Company. The Chattanooga Railway & Light Company, which operates all of the street railway lines in Chattanooga, is one of the group of Clark properties which have been referred to in previous issues as equipping with prepayment cars mounted on Brill No. 22-Special single-motor trucks. The cars of these roads have the same platform arrangements, but differ in seating plans to comply with local conditions. Chattanooga has wide streets and a generous strip between the tracks; therefore the cars are wide and the seating plan of the transverse type, with no longitudinal corner seats, but instead a transverse seat for one person at each corner. The usual corner grip handles on the seat backs are omitted and in their place



PREPAYMENT CARS FOR CHATTANOOGA, TENN. Ten of these cars, built by the G.C. Kuhlman Car Company, constitute the initial P-A-Y-E equipment of the Chattanooga lines. This car was photographed on temporary trucks. The cars will be mounted on Brill No. 22-Special single-motor trucks, shown below.

hand rails with straps are provided for the full length of the car. Windows of the single-light drop-sash type are used, with hinged covers to the pockets, and five-bar window guards enclose the lower half of the window openings.

The doors on the entrance side of the platforms are hinged to a central post and fold against the P-A-Y-E railing, which extends from this post to the bulkhead. The entrance and exit doors and their folding steps are mechanically operated, and the exit door in the body end is also opened and closed by a lever. The underframing of the cars is composed of



PREPAYMENT CARS FOR CHATTANOOGA, TENN. Brill No. 22-Special single-motor truck standard on the Chattanooga system and used under the above cars. The truck is equipped with a 65 h. p. motor.



PREPAYMENT CARS FOR CHATTANOOGA, TENN. Single transverse seats take the place of the usual longitudinal corner seats. The cars are wider than usual, being 8 ft. 5 in. over the side posts. Seating capacity 36.

4 x 7-in. side sills reinforced with $15\frac{1}{2} \times 3\frac{3}{8}$ -in. plate with $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{2}$ -in. angles riveted to the top and bottom, giving the construction the general characteristics of a Z-bar. The end sills are white oak $5\frac{1}{4} \times 7$ in., reinforced with $6 \times \frac{1}{2}$ -in. steel. Aside from the plate and wood side sills there are no longitudinal members, the crossings and diagonal braces being designed to resist the lateral and cornerwise stresses, and the side members to sustain the vertical load and strains.

Length of body	28 ft. 8 in.	From sills to trolley boards	9 ft. $7\frac{3}{8}$ in.
Length over platforms	44 ft. 0 in.	From floor to headlining	8 ft. $3\frac{1}{2}$ in.
Length of platforms	7 ft. 8 in.	From track to step	$17\frac{1}{16}$ in.
Centers of side posts	2 ft. 8 in.	From step to platform	13 in.
Width over sills	8 ft. $2\frac{1}{2}$ in.	From platform to car floor	$9\frac{5}{16}$ in.
Width over posts	8 ft. 5 in.	Seating capacity	36
Extreme width	8 ft. 8 in.	Type of trucks	Brill No. 22-Special
From track to sills	$32\frac{3}{8}$ in.	Type of motors	GE-210—2-65 h.p.

NEW ROLLING STOCK FOR LAKE CHARLES, LA.

SEMI-CONVERTIBLE TYPE

A SHIPMENT of four semi-convertible cars was recently made by the American Car Company to the Lake Charles Railway, Light & Water Works Company. The cars are of the standard Brill patented type, seated for 32 passengers; a sliding sign in the dome designates the part of the car to be occupied by colored people. The large window openings make the car practically as airy as an open-sided car and better suited to the climate, which is semi-tropical with heavy rainfall. Double-truck cars of this type have been in operation on the Lake Charles lines for the past four years and have proved their suitability to the climatic and traffic conditions in every particular.

Lake Charles has had a rapid growth during the past ten years, and being the natural center for the immense lumber trade of that part of the state, with excellent



NEW ROLLING STOCK FOR LAKE CHARLES, LA. These single-truck Brill patented semi-convertible cars, built by the American Car Company, supplement double-truck equipment of the same type.



NEW ROLLING STOCK FOR LAKE CHARLES, LA. With both upper and lower sashes raised into the roof pockets, this car is practically as open and airy as the regular summer car, and is admirably adapted to warm climates.

manufacturing and shipping facilities, it is destined to rank high among the lumber cities of the Gulf. The lines reach the base ball grounds, an amusement park and a popular beach on the lake, where there is a large pier provided with attractions of all kinds in addition to boating, fishing and bathing.

The principal dimensions of the new cars are as follows:

Length of body	20 ft. 8 in.	From floor to headlining . . .	8 ft. 4 $\frac{1}{4}$ in.
Length over platforms . . .	30 ft. 1 in.	From track to step	14 $\frac{7}{8}$ in.
Length of platforms	4 ft. 8 $\frac{1}{2}$ in.	From step to platform	12 in.
Centers of side posts	29 in.	From platform to car floor . .	7 $\frac{3}{8}$ in.
Width over sills	7 ft. 9 $\frac{1}{2}$ in.	Seating capacity	32
Width over posts	8 ft. 2 in.	Type of trucks	Brill 21-E
Extreme width	8 ft. 5 in.	Motors	West. 92—2-35 h.p.
From track to sills	26 $\frac{5}{8}$ in.	Wt. of car body (approx.) . . .	12,800 lbs.
From sills over trolley boards	9 ft. 2 in.		

A POPULAR TYPE OF COMBINATION CAR

SEMI-CONVERTIBLE WINDOW SYSTEM

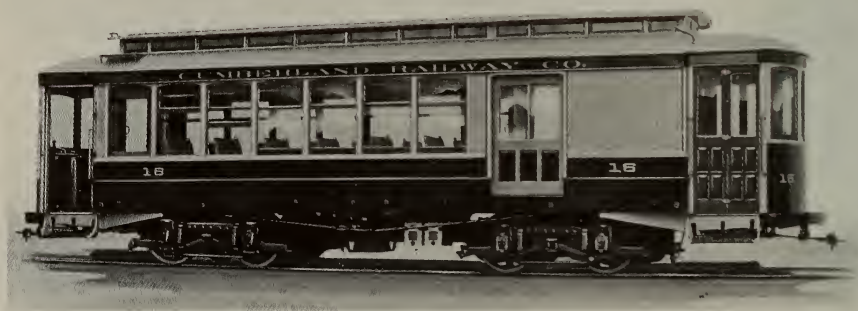
COMBINATION passenger and smoking cars of the Brill semi-convertible type have lately been delivered to the Cumberland Railway Company, of Carlisle, Pa., and to the Frederick Railroad Company, of Frederick, Md. These cities are about sixty miles apart, in the broad and fertile valleys at the northern end of the Blue Ridge Mountains. All through this section this type of car is found on the lines which extend in all directions from the important centers. Within a radius of 100 miles are the railways mentioned above, the Chambersburg, Greencastle & Waynesboro Railway, Danville & Bloomsburg Railway, Hummelstown & Campbellstown Railway, York Railways, Cumberland Valley Railroad, Cumberland & Westernport Railway, Frostburg, Cumberland & Eckhart Railway, Conestoga Traction, Hagerstown Railway, and several others, all of which lines use the same type of cars as those illustrated, and almost identical in every dimension and feature. With one or two exceptions the length of the car body is the same—30 ft. 8 in. In other



A POPULAR TYPE OF COMBINATION CAR. Length of body, 31 ft. 8 in. Length of baggage compartment, 9 ft. 2 in. Seating capacity, 32. Mounted on Brill No. 27-G trucks.

places in Pennsylvania and Maryland the same car will be found; amongst these are Scranton, Shamokin, Punxsatawney and Warren, and in various parts of the country, but the use of the type on such a number of roads within a comparatively small territory must have some definite reason. In the first place, the districts tributary to all of these neighboring railway lines have about the same distribution of population, the same industries and general conditions. The cities which the lines connect or radiate from are centers of diversified manufactures, and are the markets for much of the dairy and garden products of the farms along the lines; also the farms obtain supplies from the nearby cities. With such cars the lines can furnish transportation both to the inhabitants and to the products and merchandise of the region. If the baggage compartments are not filled with goods or produce, they can be used as smoking compartments and are provided for that purpose with folding benches. The lines are not long, probably averaging 8 to 10 miles for each division, and in most cases the track is along the principal highway of the section. The cars are run at frequent intervals throughout the day, and trailers are used in some cases during the early morning, at noon and evening.

Dropped platforms and single platform steps are used because of the frequent stops and because the passengers mount



A POPULAR TYPE OF COMBINATION CAR. Length of body, 29 ft. Length of baggage compartment, 9 ft. 2 in. Seating capacity, 28. Mounted on Brill No. 27-G trucks.



A POPULAR TYPE OF COMBINATION CAR. A typical interior of a Brill semi-convertible combination car.

from the pavement or roadway. Most of the cars are mounted on Brill No. 27-G trucks, which operate smoothly at 35 miles an hour. The semi-convertible feature has long been popular throughout the large and small cities of this part of the country and, by the way, was first used in cars built for one of the cities in this particular section. It adapts the car equally to summer and winter service, permits a light, staunch construction, and carries with it several decided advantages over the drop-sash type, and in all particulars is as well suited to this class of service as to city service, where it is best known.

The principal dimensions of the Cumberland Railway cars are as follows:

Length of body	29 ft. 0 in.	Centers of side posts . . .	2 ft. 8 in.
Length over platforms . . .	38 ft. 5 in.	Width over posts	8 ft. 2 in.
Length of platforms	4 ft. 8½ in.	Track to sills	2 ft. 7¾ in.
Length of baggage comp. . .	9 ft. 2 in.	From sills over trolley b'ds .	9 ft. 2¾ in.

The principal dimensions of the Frederick cars are as follows:

Length of body	31 ft. 8 in.	From sills over trolley b'ds	9 ft. 4 $\frac{7}{8}$ in.
Length over platforms	41 ft. 1 in.	Floor to headlining	8 ft. 5 $\frac{1}{8}$ in.
Length of platforms	4 ft. 8 $\frac{1}{2}$ in.	Track to step	17 in.
Length of baggage comp.	9 ft. 2 in.	Step to platform	14 $\frac{1}{2}$ in.
Centers of side posts	2 ft. 8 in.	Platform to floor	8 $\frac{1}{8}$ in.
Width over posts	8 ft. 6 in.	Seating capacity	32
Track to sills	2 ft. 8 $\frac{3}{4}$ in.	Trucks	Brill 27-G1



A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

IV

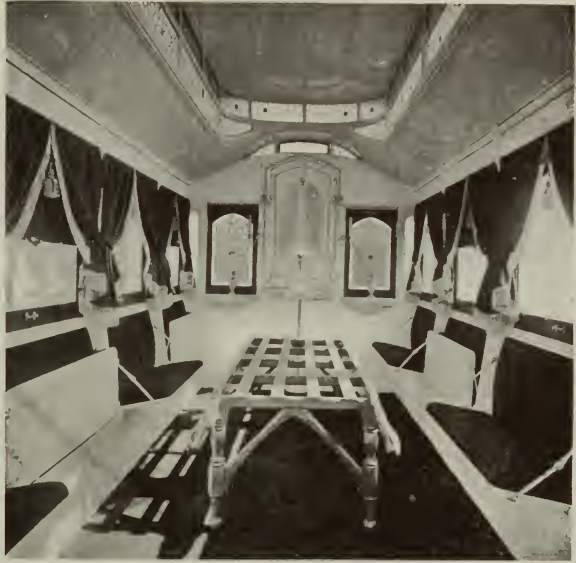
A TRIFLING retrogression will give a résumé of the progression of the work. The two-horse street cars of 1870 were 16 feet long and were heavy in proportion to their carrying capacity, for, while seating only 22, they weighed almost three tons.

An inventor by the name of J. B. Slawson, who was connected with the street railways of New Orleans, introduced the fare-box and bob-tailed car, both of which at about that time were much used throughout the United States and materially increased the number of cars in operation.

There were built for the Latin-American countries at this time funeral cars of several classes. The costliest was decorated with black hangings; with black plush seats which could be swung out of the way and which carried the mourners; with a white altar and superincumbent crucifix; and gorgeous lamps were along the outside. Each had a bier, and the entire rear end of the car was removable. The second-class had simpler arrangements, while the third-

class was arranged with two tiers in which six coffins could be stowed.

Another type of car was the open summer car which was in use at about this time and was very simple in its construction. A little later malleable iron panels for the ends of the seats formed an innovation of a very considerable degree of merit.



Funeral cars furnished to the street railways of Latin-American cities were more or less elaborate, according to the class of service. The interior illustrated is of a first-class car

Steam motor cars were built at Troy and were operated by Ransom engines and were in use in Philadelphia during the Centennial year. Later the Brill Company built a number of cars for steam operation for the Baldwin Locomotive Works and about 1885 a car with an oscillating engine, in which the cylinders were hung on trunnions as the cylinders oscillated, was designed and constructed by General John B. Imboden,

the celebrated cavalry general of the Confederate service, which was experimented with for a considerable time in Philadelphia.

The system of operation by un-



One of the earliest vestibuled trolley cars with "steam car" roof. Built in 1891



A typical trolley car of 1890-91, mounted on the first truck to have plate springs in addition to coil springs. This combination and arrangement of springs reduced the oscillation of the car body

derground cables came into use in eastern cities about 1885. San Francisco was the first, in 1873, to use this method of propulsion, actuated thereto by the very stiff grades in that city. It was followed by cable

lines in Philadelphia in 1884; Pittsburgh, Cincinnati and New York, a number of years later. Strangely, New York is one of the few cities in the world which retains old-fashioned horse cars, although a few times a year orders are placed for horse cars for plantation service.

We have now arrived at the date of the year 1890, which finds the Brill Company domiciled and under full headway at the 62d Street plant, the locality of which, though named "Mount Moriah," the appellation of the dominant cemetery in that section of Philadelphia, yet no characteristics of a place for the dead were imparted to these works, which were merrily busy day and night providing for the living, with George Martin Brill at the helm, James Rawle handling the purse-strings, John A. Brill distributing the product and working his clever brain day and night for new features. Competition had not as yet become so fierce, and the next few years were merry ones. [TO BE CONTINUED]



A forerunner of the present double-truck city car. This was one of the first cars to be operated with "maximum-traction" trucks. Built early in 1891

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

**American
Car Company**
St. Louis, Mo.

**G. C. Kuhlman
Car Company**
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

**Wason
Manufacturing Company**
Springfield, Mass.

**Danville
Car Company**
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Mexico

International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Italy

Giovanni Checchetti
Piazza Sicilia, 1
Milan

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tones & Co.
Hong Kong, Canton
Shanghai



OMNIBUS BODIES

For the development of outlying districts before investing in track and overhead material, which entail a series of fixed charges, omnibuses of this kind might be used. The cost is somewhat less than the cost of a car and the bus can cover a wider field and can change its route if circumstances show that development is taking a different course than expected. If the suburb fails to develop, the equipment still has a tangible value and can be utilized elsewhere. If the population increases sufficiently to warrant the construction of a railway, the buses lose none of their value thereby, being available for the development of some other suburb. The omnibus illustrated has longitudinal seats accommodating eighteen passengers and there is standing room for as many more. There is but one entrance and exit, so that one man serves both as chauffeur and conductor.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

Vol. V

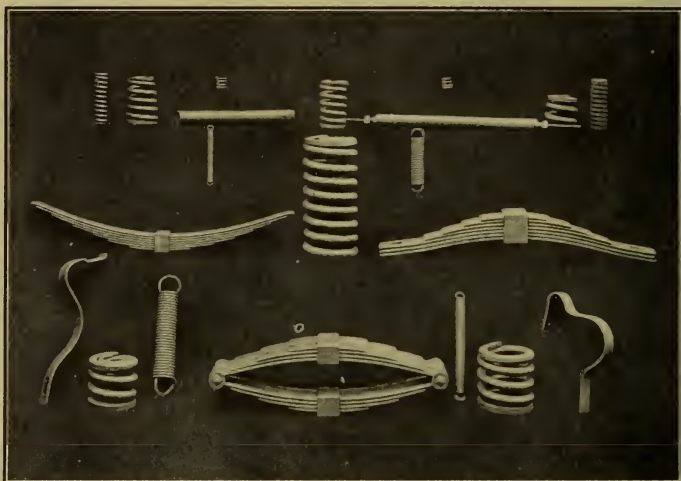
MAY, 1911

No. 5

BRILL MAGAZINE



Market Street
San Francisco

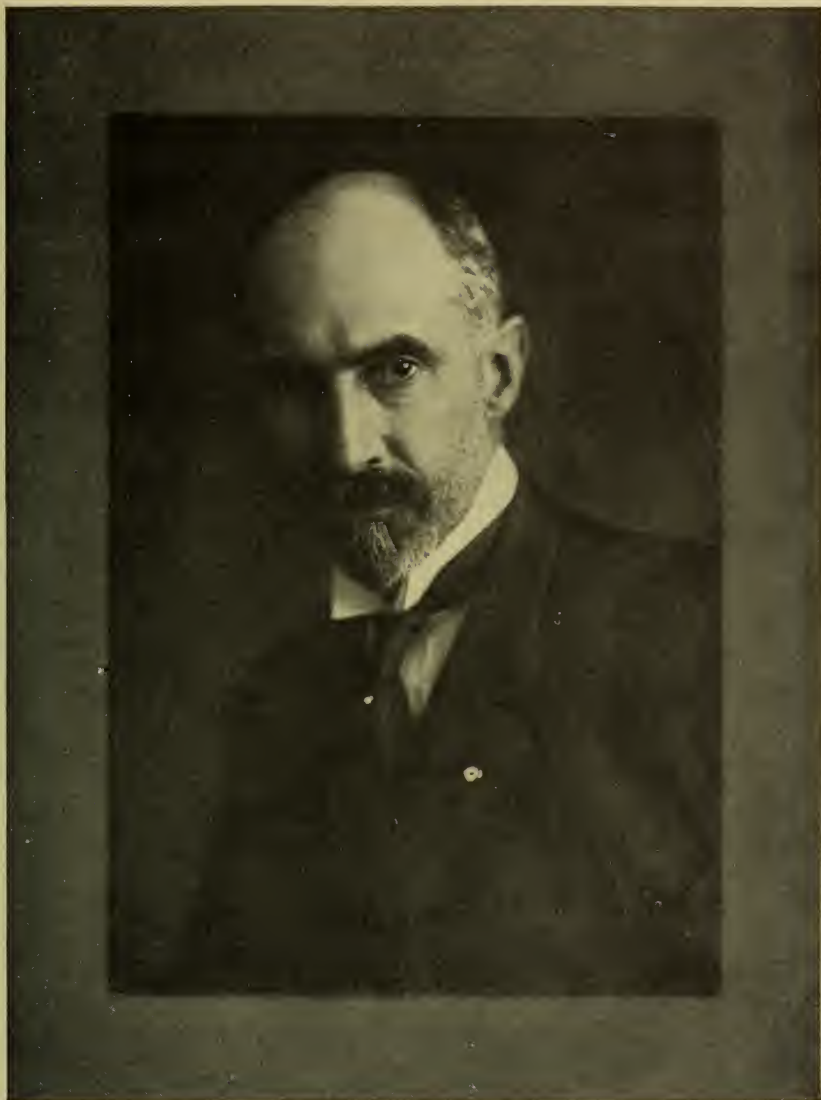


BRILL SPRINGS

MADE FROM PENNSYLVANIA RAILROAD ANALYSIS STEEL

Brill trucks owe much of their success to Brill springs. They are made from high carbon, low phosphorus steel and each spring is separately tested for deflection under predetermined loads by hydraulic testing machines of the most modern types. The same quality springs made under the same rigid requirements can be obtained for replacements, and the capacity of our spring shop enables us to make prompt deliveries. We make every description of spring for railway cars and trucks, also heavy locomotive driving springs, and are prepared to handle small orders as well as large.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



Chas. N. Black

VICE-PRESIDENT AND GENERAL MANAGER
UNITED RAILROADS OF SAN FRANCISCO

BRILL MAGAZINE

Vol. V

MAY, 1911

No. 5

CHARLES N. BLACK

[WITH PORTRAIT INSERT]

CHARLES NEWBOLD BLACK, vice-president and general manager of the United Railroads of San Francisco, was born in New York City in 1867. He was educated in his native city and later at Princeton University, from which he graduated in the class of 1888 with the degree of A. B., and after a two-years' post graduate course in engineering at the same university, received the degree of E. E. Entering the employ of the Brush Electric Company, of Cleveland, he advanced quickly from one position to another and was superintendent and general electrician when he resigned to take charge of a branch factory in New Haven of the Walker Manufacturing Company, of Cleveland. In 1899 he went with the Westinghouse Electric & Manufacturing Company, first in Pittsburgh and later in Philadelphia. His next office was with Ford, Bacon & Davis, of New York, where he remained five years; then with the Metropolitan Street Railway Company, of Kansas City, as vice-president and general manager of the operating company; also of the Kansas City Railway & Light Company, and Kansas City Electric Light Company. In 1907 he accepted the offices which he now holds in San Francisco. He is also a director in the United Railroads, and in the Sierra & San Francisco Power Company, of which he is vice-president. Mr. Black is a member of the American Institute of Electrical Engineers and is third vice-president of the American Electric Railway Association.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

SAN FRANCISCO*

SAN FRANCISCO, the largest city of the western half of the United States, is built at the upper end of a peninsula enclosing the southern part of a bay of the same name and is at the center of the long coast line of California. The city is nearly square in shape, about $7\frac{1}{2}$ miles each way, with most of the streets running at right angles and the main business thoroughfare, Market Street, bisecting it from the northeast corner to the southwest. The city has a population of 420,000 and the railway lines serve about 450,000. Across the bay is Oakland, with a population of 225,000 and a string of populous towns on each side and at different points on the bay, all connected with San Francisco by an extensive system of ferries and steamboat lines and contributing a large amount of traffic to the lines which converge at the Ferry Building, foot of Market Street. At this point and at Third and Market Streets occur the greatest congestion during the rush hours, which are from 6 to 8.30 in the morning and from 4.30 to 6.15 in the evening. The congestion is severe all along Market Street through the business section, as it is the main artery of travel of the city and carries the bulk of the street car traffic. Parallel to Market and one block south is Mission Street, which is next in importance as a business and traffic thoroughfare and which turns after leaving the business district and traverses the populous central section known as the Mission and continues to a short distance beyond the southern boundary line; the Mission Street line extending the whole distance, about $7\frac{1}{2}$ miles. Another long line, but nearer to the bay, serves this part of

* The twenty-ninth article of this series.



the city; and running to Ocean Beach, on the west side, are several long lines. The development of the outlying portions of San Francisco is therefore chiefly in these directions, and while the city belongs to the peninsular class, it will be many years before the limiting effect of the peninsula is felt, and in the meantime the development will proceed on the radiating plan.

The topography of San Francisco makes the street railway problem about as difficult as it is in any large city in the country. Generally speaking, the residence district consists of a series of hills involving very steep grades. The business section of the city lies along the bay shore and is fairly level. These lines in the majority of cases require operation on grades all the way from 27% down. For this reason San Francisco was less inclined to take up electric traction than it might have



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Market Street near Third. This is the center of the most crowded part of the business district. Also the center of an area of four square miles destroyed by the fire and earthquake of April 18, 1906



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Loop within a loop at the Ferry Building, foot of Market Street. The multitudes which come and go daily across the bay pass through this building. Lines from all parts of the city converge here and the congestion is severe during the morning and evening rush hours

been otherwise. Cable roads, in spite of their expensive operation, were generally used up to the early nineties, and suburban traffic at that time was handled with small steam locomotives. Gradually a few crosstown lines, whose grades were not heavy, were equipped with electricity and the only interurban line down the peninsular to San Mateo was built. Naturally these conditions had a marked influence on the type of rolling stock. The early cable cars consisted of two parts, the small framework, carrying the cable grip—known as the dummy—followed by a small trailer. Subsequently the dummy and trailer were combined in the same framework, making substantially a double-truck car. When electrical operation commenced, a car, which has since been known as the California type, was developed. This consisted, generally speaking, of a central closed portion with two open ends. In some of the cars the open ends had transverse seats, and in some the transverse seats faced outward. This car, having double trucks, was simply a growth of the orig-

inal cable car idea, the climate of San Francisco being somewhat responsible for retaining the open sections. During eight or nine months of the year it is sufficiently mild for outside riding, as a matter of preference, though heavy fogs and sudden chill winds require a closed portion for some of the passengers.

With the great fire of 1906, a complete rebuilding of the



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. California combination open and closed car. This type originated in San Francisco in the early days of cable railways and was the standard car of the United Railroads prior to the fire

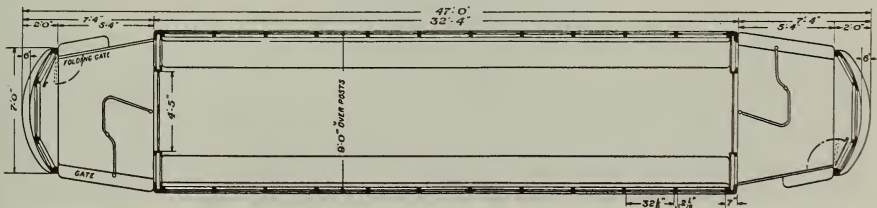
track within the burned area was necessary. While a gradual transition from cable to electric operation would probably have come about normally on account of the increased cost of operation of the cable road, the fire gave the opportunity for a complete change immediately. With an area of four square miles in ruins, the rebuilding was permanent and substantial. The total mileage of single track within the burned area was 60 operated by overhead trolley and 40 by cable. With the rebuilding, only two or three comparatively short



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Pay-As-You-Enter Car recently introduced. Eighty of these cars will be put in operation this year

lines were rehabilitated as cable lines, and these only because the grades were prohibitive from the standpoint of electric operation. The steepest grade in actual electrical operation at the present time is known as the Fillmore Street hill, which is two blocks long, 27%. This piece of track is operated, however, with a weight balance in addition to the trolley. There are in regular operation, without weight balance, grades several blocks long, 13%, and a block each, 14% and 16%.

As an item of interest, while the combined electric and cable system of the city is now up-to-date and well operated, it is a peculiar fact that there is at present practically every type of traction lines actually in service, with the exception of the old steam dummy, which originally carried suburban traffic. Owing to a franchise dispute, a short section



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Plan of Pay-As-You-Enter Car. A folding gate closes the left side of the motorman's platform and a mechanically operated screen gate closes the exit on the right side

is still operated with horse cars. One short line, owing to property owners' dislike for overhead trolley, has the original cable dummy and trailer with cable operation. A few heavy grade lines are still operated with up-to-date double-truck cable cars, and the successive steps in types of traction and rolling stock are still represented up to the modern closed double-truck car arranged for fare prepayment.

With the exception of $11\frac{1}{2}$ miles of cable railways of the California Street Cable Railroad, $7\frac{1}{2}$ miles of the Geary Street Park & Ocean Railroad, also cable, and 8 miles of electric lines of the Presidio & Ferries Railroad, all the street railways are operated by the United Railways of San Francisco and consist of 261 miles electric and 14 miles cable. The United Railroads has three different types of cars which might be considered standard, *i.e.*, the California combination open and closed type which is operated on a number of the divisions; the cross-seat closed car, which is most prominent on



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of Pay-As-You-Enter Car. The seating capacity is 48. The window sashes drop into covered pockets and the deck sashes are operated in pairs

the Market Street and tributary lines; and the new P-A-Y-E cars, of which the first lot were put in operation two months ago on the Sutter-Jackson Street and Cliff House lines, running across the northern part of the city. It is expected that there will be 80 of the latter cars in operation before the end of summer. The United Railways System has in all approximately 600 electric motor cars and 50 cable cars. The three other railway companies together have about 100 cars.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Platform of Pay-As-You-Enter Car. The curved dividing railing is arranged to slide up out of the way, leaving the front platform unobstructed

The California type of car measures 37 ft. 2 in. over the dashers; the closed section is 13 ft. 2 in. long and the open section 12 ft.; width over sills, 7 ft. 10½ in., and over posts, 8 ft. 2 in.; height of steps, 14 in., 12 in., and 12 in.; seating capacity, 36; four 35 h. p. motors per car; weight of car and trucks completely equipped, 36,000 lbs. The cross-seat closed type is 32 ft. 4 in. over the body; 45 ft. 4 in. over platforms; length of platforms, 6 ft.; width over straight sides, 9 ft.; step heights, 15¾ in. and 10 in.; seating capacity, 44; four 50 h. p. motors per car; weight of a car and trucks completely equipped, 55,830 lbs. The Pay-As-You-Enter car dimensions are shown on the diagram on page 31.

LARGE PREPAYMENT CARS FOR SPOKANE, WASH.

INITIAL EQUIPMENT

THE Washington Water Power Company has just received 25 cars of the type illustrated, from The J. G. Brill Company, and will at once inaugurate the Pay-As-You-Enter system in Spokane. These are the longest closed prepayment cars that have been built for surface railways and



PREPAYMENT CARS FOR SPOKANE, WASH. The Pay-As-You-Enter System is being inaugurated in Spokane with 25 of these cars. Arranged for single-end operation. The cars are mounted on Brill No. 27-E1 trucks

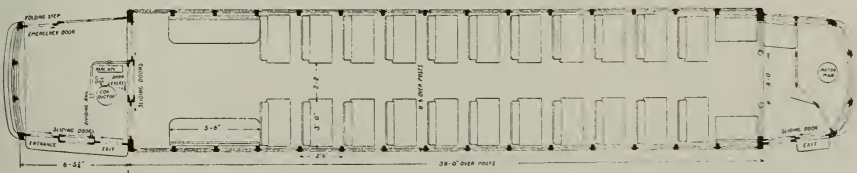
measure 38 ft. over the body corner posts, 51 ft. over all, and have a seating capacity of 58. The diagram and photographs show that the cars have unusual features in the platforms both at front and rear; the principal novelty being sliding doors at the entrance and rear exit. These doors are practically of the same width and are operated by a pair of vertical levers which are fulcrumed in a casting on the floor at the right of the conductor. The levers can be operated singly or together and the movement is but 10 inches and requires comparatively little effort. Another lever fulcrumed at the lower part of the bulkhead, behind and at the left of the conductor, operates the exit door in the body end. The rear platform is provided with an emergency door, placed opposite to the

entrance. A folding step works in conjunction with the door. The three sashes at the end of this vestibule are arranged to drop into pockets. The Brill No. 3-C fare boxes which are used on these cars have all-steel cases and are equipped with four-compartment tills. The location of the fare box, dividing railing, door levers, etc., will be seen on the diagram.

Each side of the car body has 15 double-sash windows, with upper sashes stationary and lower sashes raising their full height. The deck sashes are operated in pairs, with single fixed sashes between each operating pair. The seats have stationary backs and pressed-steel pedestals. At the wall-end they come with-



PREPAYMENT CARS FOR SPOKANE, WASH. These are the first prepayment cars in which the entrance and exit doors are separated by a panel into which they slide. The doors are operated singly or together by a pair of levers. The fare box is the Brill No. 3-C type



PREPAYMENT CARS FOR SPOKANE, WASH. These are the longest closed prepayment cars which have ever been built for surface railways. Seating capacity, 58

in the line of the window posts, as there are no window pockets, and thus save a few valuable inches on both sides. Ash is used for the interior finish and birch veneer for the ceilings.

A commodious cab is provided for the motorman at the front platform and space is left for a double seat at the left.



PREPAYMENT CARS FOR SPOKANE, WASH. The upper window sashes are stationary and the lower raise full height. The deck sashes are operated in pairs, with single fixed sashes between each operating pair

The omission of the bulkhead gives an open and attractive appearance to this end of the car. The exit door is controlled by the motorman, whose cab windows give him a clear view of passengers leaving. The window sashes at the left of the cab operate the same as in the car body and the front sashes drop into pockets. Brass rods protect the glass in the partition and three-bar guards extend along the windows on the left side of the car and are hinged to allow them to drop down.

The bottom framing of the cars is composed of 4 by 8 $\frac{3}{4}$ -in. yellow pine sills with 15 by $\frac{3}{8}$ -in. steel plates on the inside and these plates reinforced with 2 $\frac{1}{2}$ by 2 $\frac{1}{2}$ by $\frac{1}{2}$ -in. angles. An inside truss rod of 2 $\frac{1}{2}$ by $\frac{1}{2}$ -in. steel extends horizontally the length of 11 windows and at the second post from the corner posts is supported by two 1 $\frac{1}{2}$ by 1 $\frac{1}{2}$ by $\frac{1}{2}$ -in. angles,



PREPAYMENT CARS FOR SPOKANE, WASH. The motorman operates the front exit sliding door by a lever in his cab. The omission of the bulkhead gives an open and attractive appearance to this end of the car

secured to the sill plate and to the post, from which it turns down to the end of the side sill where it is anchored by means of a heavy casting. The undertrusses are of the usual type, braced with queen posts dropped from the two needlebeams. Channel steel knees support the platforms both at the side and at the center. The side posts of the body framing are 3 $\frac{1}{4}$ -in. thick and the corner posts, 3 $\frac{5}{8}$ -in.; sweep of posts, 1 $\frac{3}{4}$ -in. The cars are mounted on Brill No. 27-E



PREPAYMENT CARS FOR SPOKANE, WASH. Rear platform emergency door with mutually operating folding step

trucks with 6-ft. wheel base and 34-in. rolled steel wheels; the bolster centers are spaced 26 ft. apart.

The No. 27-E type of truck has been standard on the interurban lines of this system for many years, and the short-base truck, built on the same principles, is the standard truck of

the city railway, excepting on certain long lines where high speeds are attained after leaving the city limits.

Cars for the city system of the Washington Water Power Company at Spokane were described in BRILL MAGAZINE of August, 1907, and of July, 1909. In the latter issue were also described and illustrated two types of interurban cars used in train service on the company's high-speed lines between Spokane, Medical Lake and Cheney.

The dimensions and weights of the new cars follow:

Length of body	38 ft. 0 in.	From step to platform . . .	15½ in.
Length over platforms . . .	50 ft. 4½ in.	From platform to car floor .	8¼ in.
Length of front platform . .	5 ft. 6 in.	Seating capacity	58
Length of rear platform . . .	6 ft. 10½ in.	Type of trucks	Brill 27-E1
Centers of side posts	2 ft. 6 in.	Motors	GE-80—4-40 h.p.
Width over sills	8 ft. 3½ in.	Weight of car body, less electrical equipment . . .	25,000 lbs.
Width over posts	8 ft. 6 in.	Weight electrical equipment .	1,500 lbs.
Extreme width	8 ft. 9½ in.	Weight air brake equipment .	1,500 lbs.
From track to sills	2 ft. 10 in.	Weight of trucks	16,000 lbs.
From sills to trolley boards .	9 ft. 5 in.	Weight of motors	11,200 lbs.
From floor to headlining . .	8 ft. 5¾ in.	Total weight	55,200 lbs.
From track to step	17½ in.		

MORE P-A-Y-E CARS FOR ILLINOIS TRACTION SYSTEM SINGLE-TRUCK TYPE

THE Danville Car Company recently delivered 31 cars to the Illinois Traction System for use on the lines at Bloomington, Quincy, Galesburg and Decatur, Ill., and Topeka, Kan. The Danville Car Company furnished six double-truck P-A-Y-E cars to the Bloomington lines last year, and the American Car Company built 30 for the McKinley Bridge lines. The new single-truck cars are all the same excepting in the painting and are represented by the photographs of one of the Galesburg cars. As will be seen, they are double-end P-A-Y-E cars completely vestibuled and with entrance and exit doors in the body ends separated by a bulkhead into which both doors slide. Twenty-seven passengers are accommodated on the longitudinal seats and folding corner seat. The metal box against the bulkhead, which will be



MORE P-A-Y-E CARS FOR ILLINOIS TRACTION SYSTEM. Thirty-one of these cars have recently been furnished to six different lines of the system



MORE P-A-Y-E CARS FOR ILLINOIS TRACTION SYSTEM. The side windows have stationary upper sashes and lower sashes that drop into pockets. The seating capacity of the car is 27

noticed in the photograph of the car interior, is the upper part of the sand box, located here as it is more convenient than under the seat and there is more room for the valve and hose under the frame at this point.

The entrance and rear exit doors are both hinged to a wooden upright midway of the platform step, and swing against the dividing railing which extends from this upright around to the bulkhead. The platform steps are of the regular stationary type. Extra heavy knees are used to support the platforms, and the framing throughout is unusually substantial.

Length of body	21 ft. 0 in.	From sills over trolley boards	9 ft. 5 in.
Length over platforms	32 ft. 7 in.	From floor to headlining	8 ft. 4 $\frac{1}{8}$ in.
Length of platforms	5 ft. 9 $\frac{1}{2}$ in.	From track to step	15 in.
Centers of side posts	33 in.	From step to platform	13 in.
Width over sills	8 ft. 2 in.	From platform to car floor	10 in.
Width over posts	8 ft. 2 in.	Seating capacity	27
Extreme width	8 ft. 4 in.	Motors	GE-88—2-45 h.p.
From track to sills	30 $\frac{1}{4}$ in.		

INTERESTING CARS FOR PORTO RICO

SINGLE-MOTOR TRUCKS

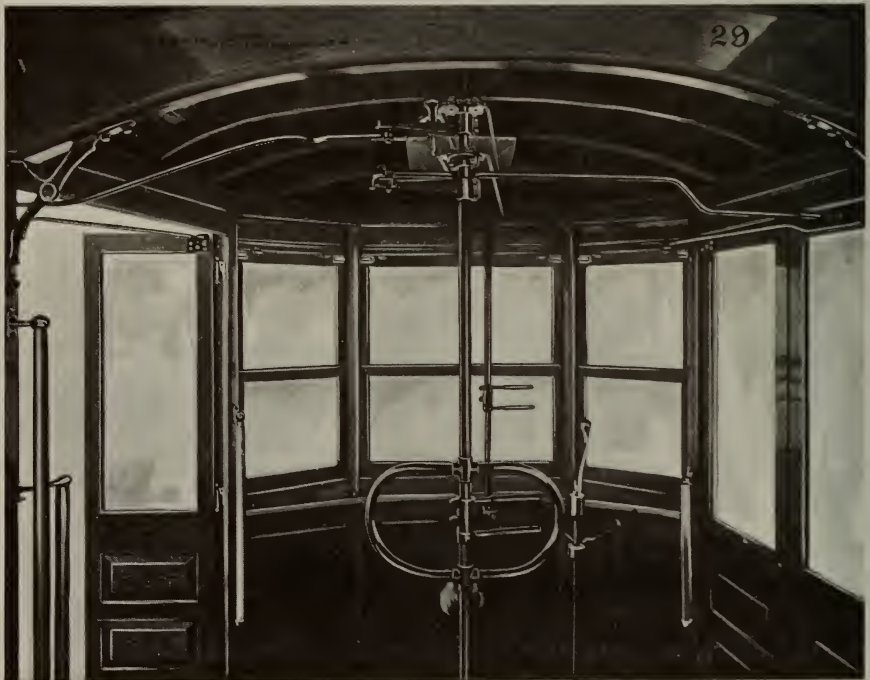
THE San Juan Light & Transit Company has lately added to its equipment ten center-aisle open motor cars built by The J. G. Brill Company. The cars are of the same type as originally furnished to the Third Avenue Railway, New York, and subsequently to City & Suburban Railway Co., Brunswick, Ga.; Lehigh Valley Transit Co., Allentown, Pa.; Charleston Consolidated Electric Railway Co., Charleston, S.C.; Consolidated Railways, Light & Power Co., Wilmington, N.C.; Yakima Valley Transportation Co., Yakima, Wash.; and Asheville & East Tennessee Railroad Co., Asheville, N.C. The cars for San Juan differ, however, from those furnished to the lines just mentioned, in that the sashes were omitted, as the climate of Porto Rico is mild during the winter and does not call for closed cars. If at any time it should be desirable to close the cars, sashes with panels can be easily obtained. It makes an ideal car for a warm climate, as it combines the advantages of a center-aisle car with those of the open type and eliminates the disadvan-



INTERESTING CARS FOR PORTO RICO. The climatic conditions of Porto Rico do not call for the winter equipment of panels with sashes usual to this type of car. The cars are mounted on Brill No. 39-E single-motor trucks

tages of the latter, especially in regard to the entrances. The wire screens along the sides form effectual guards and are not too high to obstruct the view of seated passengers. The vestibule doors, as reference to the photographs will show, are mechanically operated, and the arrangement is such that passengers can neither get off nor on the car until it has been brought to a stop. The platform step is also arranged to prevent persons from obtaining a foothold upon it when the doors are closed. Thus the type of car is one which is well equipped for preventing accidents.

The vestibule doors are of an unusual type and operated by an interesting mechanism. The arrangement is so well shown by the photographs that little description is necessary. The operation may be from handles located on the upright in the middle of the platform near the end sill and



INTERESTING CARS FOR PORTO RICO. While one leaf of the door is being pushed open by a long lever, the other leaf of the door is given a corresponding movement by a connecting rod

convenient to the conductor's position, or from handles on an upright at the center of the middle window convenient to the motorman's position. Either set of handles may be used by the conductor, as they are connected by sprocket wheels and chains and work in unison. The levers attached to the doors are overhead and out of the way; one long



INTERESTING CARS FOR PORTO RICO. Sprocket wheels and chains connect the two sets of door operating handles

lever is connected with the leaf of the door which is hinged to the body corner posts, and this leaf is connected by a rod to the other leaf. Sufficient leverage is given to enable both handles to be operated at the same time if necessary to admit or let off passengers at terminals. As the platform steps are stationary, the lower ends of the vestibule doors are provided with sloping covers made of sheet steel, precluding any possibility of a foothold being gained upon the step when the doors are closed.

The seating arrangement provides for 48 persons, the seats being of the Brill Winner type with push-over backs, and both seats and backs made of maple slats; a bronze grab handle is provided at the corner of the back. Longitudinal seats for two passengers each are at each side of the car next

to the corner posts. The interiors are finished in ash and cherry, with the ceilings in car-line finish. Striped duck curtains, with battens 12 inches apart, are firmly held at the edges and prevented from being blown in or allowing rain to get into the car, by having a one-inch molding running along the edges of the half-inch grooves in which the curtains slide



INTERESTING CARS FOR PORTO RICO. The heavy duck curtains have battens 12 in. apart and run in post grooves $1\frac{1}{2}$ in. deep. The cars can readily be furnished with window sashes should it ever be desirable

forming a groove one and one-half inches deep on each side of the post. The screens which are used to guard the sides are galvanized instead of painted, for better protection against corrosion, and are securely fastened in place by three clamps screwed to each post. The cars are lighted by eight lamps inside the car, placed in a row down the center. A light on each platform and two lights with each electric sign

are connected in series with their respective circuits inside the car and controlled by the main snap switch and two-way transfer switch connected with both headlights and four lights inside the car, so that these lights may be thrown on in the direction in which the car is going. The vestibule front—that is to say, the three windows—is arranged to be removed in one piece; therefore with the vestibule fronts removed, and because there are no bulkheads, there is nothing to prevent a free rush of air through the cars, making them cool and attractive to pleasure riders during the hot season. However, the climate of Porto Rico is not as hot as might be imagined from the fact that the island is in the torrid zone. The temperature rarely reaches 90 degrees and the island is one of the most healthful places in the tropical section of the Western Hemisphere. In winter the temperature never falls below 50 degrees.

The bottom framing consists of $4\frac{1}{2}$ by 7-in. side sills plated with 14 by $\frac{9}{16}$ -in. steel plates, braced by $1\frac{1}{8}$ -in. undertruss rods. The pine members of the underframe are treated with creosote, and the oak framing and under side of the flooring with carbolineum. The cars are mounted on Brill 39-E type of single-motor trucks, having 33-in. driving wheels and 21-in. trail wheels with steel tires and cast steel centers. The trucks are equipped as usual with Brill half-ball brake hangers. Truck wheel base, 4 ft. 6 in.; diameter of axles, $4\frac{1}{2}$ in. and $3\frac{7}{8}$ in.; track gage, 4 ft. $8\frac{1}{2}$ in.

The San Juan Light & Transit Company is owned by the Porto Rico Railways Company, Limited, which also owns the Porto Rico Power & Light Company and has developed the Comerio water power, 20 miles from San Juan. The power provided by the Comerio hydro-electric plant supplies the railway and lighting systems of San Juan, San Turce and Rio Piedras; also the lighting systems in Comerio, Bayamon, Cataño, Carolina and Caguas. The population served by the system is over 100,000.

Articles upon cars shipped to this system will be found in BRILL MAGAZINE of October, 1907, and February and August of 1908.

Length of body	30 ft. 0 in.	From platform to car floor	8 5/8 in.
Length over platforms	39 ft. 0 in.	Seating capacity	56
Length of platforms	4 ft. 6 in.	Type of trucks	Brill 39-E
Centers of side posts	2 ft. 5 in.	Motors	West. 306—2-50 h.p.
Width over sills	8 ft. 2 in.	Wt. of car body, less elec. equipment	20,150 lbs.
Width over posts	8 ft. 2 in.	Wt. of electrical equip.	1,500 lbs.
Extreme width	8 ft. 5 1/2 in.	Wt. of air brake equip.	1,500 lbs.
From track to sills	2 ft. 7 3/8 in.	Wt. of trucks	11,240 lbs.
From sills over trolley boards	8 ft. 11 3/8 in.	Wt. of motors	5,750 lbs.
From floor to rafters	7 ft. 11 1/2 in.	Total	40,140 lbs.
From track to step	15 1/8 in.		
From step to platform	14 1/2 in.		



INTERURBAN CARS FOR THE FAIRMONT &
CLARKSBURG TRACTION COMPANY
COMBINATION TYPE

AMONG the recent shipments from the plant of G. C. Kuhlman Car Company were four interurban cars mounted on Brill 27-E 1 1/2 trucks for the Fairmont & Clarksburg Traction Company, of Fairmont, W. Va. A



INTERURBAN CARS FOR THE FAIRMONT & CLARKSBURG TRACTION COMPANY. Four of these cars were recently delivered to this railway system in the northern part of West Virginia. The cars are mounted on Brill No. 27-E 1 1/2 trucks

description of express cars, built at the same plant and for the same company, was given in the March, 1911, *BRILL MAGAZINE*; in the April issue of 1908 single-truck cars of the Brill semi-convertible type were likewise described. This railway connects Fairmont, Monongah, Clarksburg, Adamston, Wilsonburg and Bridgeport, all of these towns being along the Monongahela River in the northern part of West Virginia. The system comprises 50 miles of standard gage track with 55 cars in operation, and the company furnishes power for lighting and manufacturing. The power plant is situated at Jayenn, on the river just above Fairmont, and is interesting on account of the remarkably low generating costs obtained by the use of turbines and the cheap fuel gas of high calorific value abundant in this region. The plant has a rating of 3,000 k.w. from four turbines.



INTERURBAN CARS FOR THE FAIRMONT & CLARKSBURG TRACTION COMPANY. The passenger compartment seats 36, and folding seats in the baggage compartment accommodate 16

The new cars are of the combination passenger and baggage type, seated for 36 passengers and arranged for double-end operation. The baggage rooms have folding seats, which increases the seating accommodation by 16. The cars are vestibuled at both ends and the platforms are dropped below the level of the floor and have entrances at each side. The entrances are provided with double steps, and folding trap doors cover the open space when the vestibule doors are closed. The windows are arranged to be raised their full height and have stops which hold them in any position. The arched tops of the twin windows are glazed with opalescent glass, as are also the ventilator sashes; curtains cover the arched as well as the lower part of the windows. Seats of Brill manufacture are used and have 22-in. backs, corner grab handles and pressed-steel pedestals. The underframing consists of 4 by 7 $\frac{3}{4}$ -in. yellow pine side sills plated on the inside with 15 by $\frac{3}{8}$ -in. steel plates; 5 $\frac{1}{4}$ by 6 $\frac{7}{8}$ -in. white oak end sills; and 4 $\frac{1}{2}$ by 5 $\frac{1}{2}$ -in. white oak cross joists. The under trusses are 1 $\frac{1}{8}$ in. diameter. The corner posts of the body are 3 $\frac{5}{8}$ in. thick and the side posts 3 $\frac{1}{4}$ in. Brill trucks of the No. 27-E1 $\frac{1}{2}$ type are used under these cars and have a wheel base of 6 ft., and have 34-in. steel-tired wheels with 3-in. tread and 1-in. flange. The axles are American Electric Railway Association standard with 3 $\frac{3}{4}$ by 7-in. journals. The track gage is 4 ft. 8 $\frac{1}{2}$ in., and the radius of the sharpest curve is 37 ft.

The principal dimensions and weights are as follows :

Length of body	34 ft. 4 in.	From track to step	15 in.
Length over platforms . . .	43 ft. 9 in.	From step to platform, 12 $\frac{1}{2}$ in. and 12 $\frac{1}{2}$ in.	
Length of platforms	4 ft. 8 $\frac{1}{2}$ in.	From platform to car floor . . .	5 $\frac{1}{2}$ in.
Length of baggage comp. . .	9 ft. 2 in.	Seating capacity	36
Centers of side posts	2 ft. 8 $\frac{1}{2}$ in.	Type of trucks	Brill 27-E 1 $\frac{1}{2}$
Width over sills	8 ft. 6 in.	Motors	West. 306—4-50 h.p.
Width over posts	8 ft. 6 in.	Wt. of car body with elec.	
Extreme width	8 ft. 7 $\frac{3}{4}$ in.	equipment	23,260 lbs.
From track to sills	3 ft. 1 $\frac{3}{4}$ in.	Wt. of trucks	17,120 lbs.
From sills over trolley boards	9 ft. 6 $\frac{1}{4}$ in.	Wt. of motors	11,500 lbs.
From floor to headlining . .	8 ft. 5 in.	Total weight	51,880 lbs.

SINGLE-TRUCK TYPE FOR COFFEYVILLE, KAN.

BRILL PLAIN ARCH ROOF

THE illustrations show an interesting type of single-truck car recently built by the American Car Company for the Union Traction Company of Coffeyville, Kan. This type of car has a Brill plain arch roof, with Brill



SINGLE-TRUCK TYPE FOR COFFEYVILLE, KAN. Thirty-two-passenger Brill Semi-Convertible Car.
Mounted on Brill No. 21-E Truck

semi-convertible windows. As will be seen from the photographs, the appearance is very attractive both from the inside of the car and from the outside. Twelve ventilators of the Star type furnish ample exhaust when the car is carrying its maximum load. The ceiling is of birch veneer painted and striped, and this, with the excellent light arrangement, gives an unusually pleasing effect to the interior of the car. Six transverse reversible seats and two longitudinal stationary corner seats on each side of the aisle furnish accommodation for thirty-two passengers. The seats have pressed steel one-piece pedestals, pressed steel aisle and wall plates, angle-iron frames, and wooden slat backs and seats. The interior is fin-



SINGLE-TRUCK TYPE FOR COFFEYVILLE, KAN. The Brill Plain Arch Roof increases the head room, allows the window openings to be higher and reduces the weight

ished in golden oak, with oak doors and window sashes. The side sills are of long leaf yellow pine, $3\frac{3}{8}$ in. by 5 in., reinforced with 5 by $3\frac{1}{2}$ by $\frac{3}{8}$ -in. angles; end sills are of white oak, $3\frac{1}{8}$ by $8\frac{5}{8}$ in.; crossings, $3\frac{1}{4}$ by $4\frac{3}{4}$ in.; corner posts, $3\frac{3}{4}$ in. thick; side posts, $3\frac{1}{4}$ in.; sweep of posts, $1\frac{3}{4}$ in. The truck wheel base is 8 ft.; wheel diameter, 33 in.; tread, 3 in.; flange, 1 in. Brill draw bars, angle-iron bumpers, platform gongs, sand box, seats and other patented specialties are used.

Length of body	20 ft. 8 in.	From floor to headlining	7 ft. $6\frac{1}{2}$ in.
Length over platforms	30 ft. 1 in.	From track to step	$13\frac{2}{8}$ in.
Length of platforms	4 ft. $8\frac{1}{2}$ in.	From step to platform	$13\frac{1}{8}$ in.
Centers of side posts	2 ft. 5 in.	From platform to car floor	$7\frac{3}{8}$ in.
Width over sills	7 ft. $9\frac{1}{2}$ in.	Seating capacity	32
Width over posts	8 ft. 2 in.	Type of trucks	Brill No. 21-E
Extreme width	8 ft. 8 in.	Motors	West. 101-B
From track to sills	2 ft. $3\frac{7}{8}$ in.	Total weight (approx.)	25,000 lbs.
From sills over trolley b'ds	8 ft. 8 in.		

MORE P-A-Y-E CARS FOR WICHITA FALLS, TEX.

BRILL No. 27-GE1 TRUCKS

FOUR handsome cars of the Pay-As-You-Enter type were lately delivered to the Wichita Falls Traction Company, Texas, by the American Car Company, supplementing Pay-As-You-Enter cars of long open type which were described in BRILL MAGAZINE of July, 1910. The cars are somewhat longer than usual for a double-truck prepayment type, being 34 ft. over the body and having a seating capacity of 40. The bottom framing consists in the main of $3\frac{3}{4}$ by $6\frac{1}{2}$ -in. side sills reinforced with $15\frac{1}{2}$ by $\frac{3}{8}$ -in. steel plates, having $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{1}{2}$ -in. angle iron riveted to the top and 6 by $3\frac{1}{2}$ by $\frac{3}{8}$ -in. angle iron riveted to the bottom, giving the construction the characteristics of a Z-bar. The end sills are of oak $5\frac{1}{4}$ by $6\frac{7}{8}$ -in., reinforced with 6 by $\frac{1}{2}$ -in. steel plates, which plates are bent at right angles at each end and bolted to the side sills. The cross sills, also of white oak, are supported and held in place by special socket castings riveted to the steel sill plates. At each cross sill a $\frac{3}{4}$ -in. tie rod is placed, which has a washer countersunk on the outside



MORE P-A-Y-E CARS FOR WICHITA FALLS, TEX. These cars measure 34 feet over the body corner posts and seat 40 passengers

of each side sill. The platforms are supported by two 8 by 3 by 3 by $\frac{1}{2}$ -in. Z-bars, which are reinforced with 7 by $\frac{5}{8}$ -in. plates riveted to the web. The interiors are finished in cherry, including doors and window sashes, and the headlinings are of birdseye maple veneer. There are 12 windows on each side of the car, with the upper sashes stationary and shaped to



MORE P-A-Y-E CARS FOR WICHITA FALLS, TEX. The window system is the Stephenson Semi-Convertible type, in which the upper sashes are raised into shallow pockets and the lower sashes are dropped into pockets in the side walls

give the effect of the windows being in pairs. The lower sashes drop into pockets provided with hinged covers. The Brill Winner type of seat is used and is furnished with corner grab handle and a socket for a sign lettered "For Colored." There are 16 transverse seats and four 36-in. longitudinal seats. The aisle is 29 in. wide. The bulkheads are furnished with two doors which slide into a pocket in the center, the entrance door in each bulkhead having a lever by which the conductor can open the door while standing in his position

back of the dividing railing. The entrance side of the vestibule has a two-section door hinged to a central post and arranged to close against the vestibule corner post, and will either open flat against the dividing rail or fold between the door post and end of the rail. A swinging door at the exit, hinged to the same post, also swings back against the dividing rail. The double leaf entrance door has a bronze swinging hand rail, similar to those used on Pullman car vestibule doors, which pivots on the door post and latches in a socket on the dividing rail. The front exit has a sliding door of the usual type which is operated by a lever mechanism. The platform steps at front and rear operate in conjunction with the doors.

Length of body	34 ft. 0 in.	From sills over trolley b'ds	9 ft. 2 in.
Length over platforms	49 ft. 4 in.	From floor to headlining	8 ft. 0 in.
Length of platforms	7 ft. 8 in.	From track to step	16½ in.
Centers of side posts	2 ft. 8½ in.	From step to platform	13½ in.
Width over sills	8 ft. 1¼ in.	From platform to car floor	9¼ in.
Width over posts	8 ft. 9 in.	Seating capacity	40
Extreme width	9 ft. 0 in.	Type of trucks	Brill 27-G1
From track to sills	32½ in.	Motors	West. 101-B

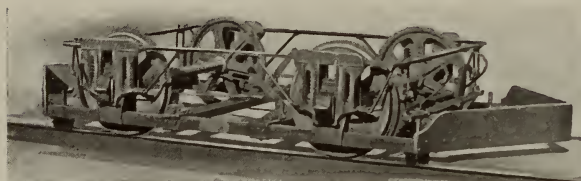


A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

V

THE early nineties were busy years in the street railway field, as city systems in all parts of the country were being electrified and capital was readily obtainable for such undertakings. During these years much of our attention was given to the development of electric motor trucks. The first type was produced early in 1888 and, as the illustration shows, was an adaptation from the horse car running-gear. This simple affair was the basis of an entirely new art—that of electric motor truck building—and the starting point of the mechanical success of electric traction. Several hundred of these trucks were built and gave good service. It is



Brill Truck No. 1, built in 1888. The art of electric motor truck building commenced with this truck, as it was the first to have an independent frame for motors

an interesting fact that the method of motor suspension adopted with this first truck has continued to this day in uni-

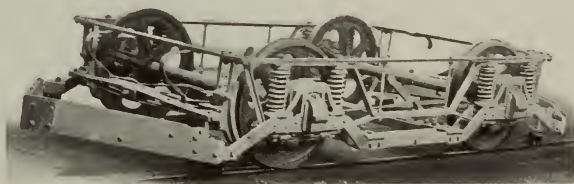
versal practice. Among the changes which quickly followed, and which were destined to be permanent features in this type of truck, were the abandonment of the enclosed pedestal springs and the adoption of spring posts. This necessitated the use of post stays, or lower chords, which, before the use of solid side frames, were trussed to the upper chords; the journal boxes were constructed with cars which carried the springs as in the old horse-car method; the base of each box was rigidly connected with the side frames, but this method did not give sufficient stability to the support of the car body, nor was there enough strength in the connection between the frames and the boxes to keep the truck square. It had appeared necessary to preserve the continuity of these side bars. Experience proved that the boxes must work in jaws which must be an integral part of the side frames. This step was a radical departure which embodied the correct principles of all truck construction, namely, the independent frame, which in addition to carrying the motors, must keep the boxes and axles in parallel relation; in other words, the squareness of the truck must depend upon the truck frames. The axle box yokes in the side frames were necessary not only for truck squareness, but also to permit the body of the truck to be lifted off the axles so that the motors might be inspected and repaired in pits.

The early motors were arranged to be carried low; therefore the side frames were also carried low. Soon motors were constructed that could be carried higher, and, what was of supreme importance, were completely encased. The encasing

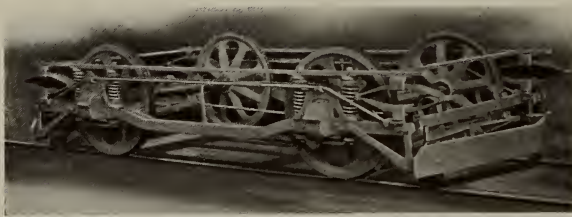
of the motors, protecting them from moisture and dirt, was immensely important to the general use of electric motor cars, since it removed one of the chief obstacles. The motor supports were wholly depended on to connect one side frame rigidly with the other. The heavy motors that came into use with the use of larger car bodies brought too much stress upon these center crossings; therefore independent motor supports were placed upon the frame and straight crossings were used at the centers between the wheels and also at the ends of the frames outside the wheels.

A serious difficulty, which for a long time baffled all attempts to overcome, was the bounding motion, or oscillation, of the car body. There was evidently something wrong with the spring system. We were the first to recognize that the difficulty lay in the fact that the rail joints produced a rhythmic motion in the coil springs; we therefore introduced slower acting elliptical springs. It was necessary to lengthen the extensions and mount the elliptical springs on the extensions, thus breaking the rhythm set up by the coil springs, and to a large extent preventing oscillation. At the same time the elliptical springs extended the spring base. Later on the full-elliptical springs were superseded by semi-elliptics, which still further extended the spring base and were slower acting.

While the single-truck was being developed, the necessity for longer car bodies arose, requiring pivotal trucks. The height of cars could be little increased, space between the tracks could not be widened, and the radii of curves must remain practically the same as before. How to find room for double-trucks to radiate under narrow cars was the problem. Little



Brill Truck No. 6, built in 1889. The frame of this truck included journal yokes, which was a long step in the progress of truck construction



Brill Truck No. 13, built in 1890. The first truck to have plate springs in addition to coil springs. This feature soon became universal, as it largely overcame the oscillation of the car body

was to be learned from steam road practice; the limitations of operating on streets made the case entirely different, requiring the evolving

of new principles of construction throughout. To give room for the motor and to allow the trucks to be located near the ends of the car body, and yet to avoid the steps and sills, were the reasons for placing the bolster out of center in the first pivotal truck which was built. This resulted in loss of traction, as the motor was applied to the wheels carrying the smaller proportion of the load; it was, in fact, a true "minimum-traction" truck. The advantage of having ample tractive power was quickly discovered, and the next type was the "maximum-traction" truck—the first of its kind, unique in idea and design, the truck consisting of a pair of ordinary-sized driving wheels and a pair of pony wheels with the weight eccentrically distributed, so that the large wheels carried nearly all of the load, the pony wheels bearing just enough to enable them to guide on the track. This truck was invented by John A. Brill and was introduced in 1890. After various modifications were made, the truck came into large use both at home and abroad, and today, under the name of the "single-motor" truck, is the leading truck in the city railway field. [TO BE CONTINUED]



Brill Truck No. 11, built in 1890. This was the first "maximum-traction" which, after a number of changes, became the most largely used truck in city railway service, and today, as the "single-motor" type, holds the leading place

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

American
Car Company
St. Louis, Mo.

G. C. Kuhlman
Car Company
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

Wason
Manufacturing Company
Springfield, Mass.

Danville
Car Company
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Mexico

International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Italy

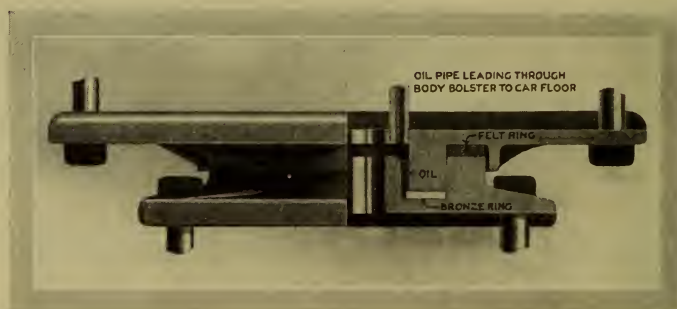
Giovanni Checchetti
Piazza Sicilia, 1
Milan

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai



BRILL OIL-RETAINING CENTER BEARING

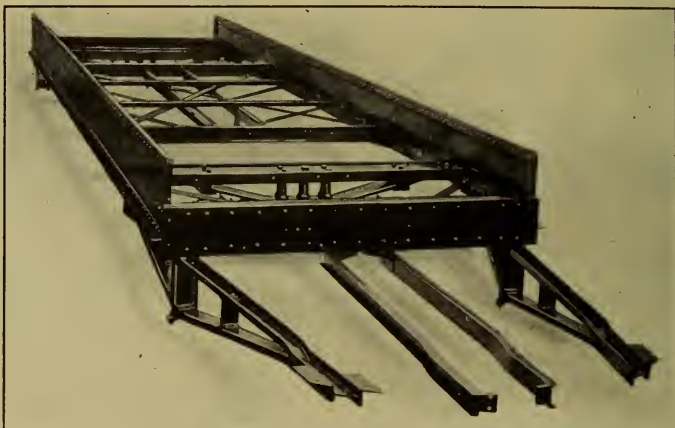
This center bearing is now used almost exclusively on Brill pivotal trucks. A phosphor bronze ring placed in the bottom of the lower plate receives the wear, and as this ring is constantly in a bath of oil and the oil is protected from dust and dirt by a felt ring, the wear is reduced to a minimum and the lubrication is perfect. The oil reservoir holds from one-third to one half pint, according to size of bearing, and the oil is replenished through a pipe leading up through the car floor. Lubrication by grease is unsatisfactory as the grease does not get under the wearing surface sufficiently. The Brill Center Bearing was devised to overcome this defect and to avoid the use of roller and ball bearings with their liability to flattened rollers and pitted ball races.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



König-Strasse
Berlin, Germany



STEEL UNDERFRAMES

The underframe illustrated is the standard design for a 30-ft. 8-in. Brill Semi-Convertible car with 6-ft. platforms and weighs 4,476 lbs. The same general design is adaptable to any type of double-truck city car. The wide thin steel sill plates are reinforced along the top and bottom edges to give the maximum strength for a minimum weight of section. Having no truss rods enables the side wall lining to be set in between the posts and the space thus saved to be utilized by the seats. The increasing demand for steel underframes has developed a large variety of types applying to all classes of passenger and baggage cars. Our facilities for steel construction enable us to accept large orders, subject to quick deliveries.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



A. L. C. Fell

CHIEF OFFICER OF THE LONDON COUNTY COUNCIL TRAMWAY SYSTEM

BRILL MAGAZINE

Vol. V

JUNE, 1911

No. 6

A. L. C. FELL

[WITH PORTRAIT INSERT]

AUBREY LEWELLYN COVENTRY FELL, chief officer of the London County Council Tramway System, was born in Llangollen, North Wales, in 1869. Educated at Christ Church College, Finchley, and the School of Electrical Engineering, Hanover Square, he served an apprenticeship with Laing, Wharton & Down, electrical engineers and contractors, London. Continuing with this firm, which subsequently became the British Thompson Houston Company, he was placed in charge of many important electric traction and lighting installations. He left the British Thompson Houston Company in 1897 to become the electrical engineer of the Sheffield Corporation Tramways, and three years later, after having installed the complete electrical equipment for the tramway, including the power station, became the general manager of the system and was thus engaged when, in 1903, he was selected chief officer of the London County Council Tramways. The London, Deptford & Greenwich, the London, Camberwell & Dulwich, the Woolwich & Southeast London, the North Metropolitan and the London Southern Tramway Companies have been acquired by the London County Council since Mr. Fell has been at the head of the tramway system. The staff under his management numbers 11,000 persons and his responsibilities include the management of the whole system, including the central power station at Greenwich and the central repair depot at Charlton. He is a member of the Institution of Electrical Engineers, the Institution of Mechanical Engineers and other institutions and associations.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

BERLIN*

BERLIN, the capital of Prussia, residence of the German Emperor and the seat of the Imperial Government, has a population of about three and one-quarter millions, including its immediate suburbs. The city is situated in the broad level valley of the navigable river Spree and is the chief center of the railway system of Germany. Berlin is the first commercial center of the country and the greatest manufacturing city of continental Europe. The boundaries of the city proper enclose an area of twenty-five square miles and its twenty-six suburbs have an area of ninety-five square miles, making a total of one hundred and twenty square miles. It is essentially a modern city, as the photographs show, the many ancient two-storied houses which formerly characterized it having given place to blocks of splendid buildings. The west end and the southwest are the residential quarters; the northwest is largely occupied by academic, scientific and military institutions; the north is the seat of machinery works; the northeast of the woolen manufactures; the east and southeast of the dyeing, furniture and metal industries, while in the south are great barracks and railway works.

Aside from the Städtichen Strassenbahnen, or municipal street railway, a line running around the northern and eastern parts of the city, the street railways of Berlin and suburbs are operated by the Grosse Berliner Strassenbahn and its allied companies. This company operates about 3,000 motor cars and 1,000 trailers, over about four hundred miles of track. The lines of the company are in nineteen distinct municipalities, with franchises of widely differing character. Within

* The thirtieth article of this series.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Street railway map of Berlin. The broad lines indicate the Städtischen Strassenbahnen (Municipal Street Railways) and the narrow lines represent the Grosse Berliner Strassenbahn

the last few years the elevated and subway lines and motor omnibus lines have come into competition with the street railways, but in spite of this fact the business of the company has steadily increased and the traffic has grown in greater ratio than the population of the city and suburbs—large as that has been. It is interesting to observe that 80 per cent. of the company's entire traffic is handled in Berlin proper, with 70 per cent. of the total car miles operated and 52 per cent. of the total trackage. These figures show that the suburban districts have not yet reached the most profitable point of travel density.

All cars of the subsidiary companies are maintained in the shops of the parent company, but each corporation owns its own cars. The contract between the companies calls for the

through operation of any car over any desirable combination of routes; each company, however, is directly in charge of the service over its tracks and therefore must assume all legal responsibility and all injury and damage suits, etc., involved in its particular section. Employees of each company are bound by the rules and instructions of the line over whose tracks they are running.

The traffic development of Berlin is of a radical character.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Potsdamer Platz. This square is at the west end of Leipziger Strasse, the busiest street of Berlin, and from here radiate nearly all the lines of the western section of the city

Nearly all of the cars traverse a part of Leipziger Street, the main business thoroughfare, after which they radiate in all directions. It has been the policy of the company to run through cars to each part of the city as far as possible; therefore, as a result, only about 15 per cent. of the passengers transfer. The standard cash fare on most of the lines has been $2\frac{1}{2}$ cents, and on a few extensions $3\frac{3}{4}$ cents; no free transfers are issued, except on a small part of one of the lines. The highest fare charged on any line interconnected with the

suburban system is 5 cents. Workmen's tickets and school tickets are issued at low rates by the week and monthly tickets for an unlimited number of rides can also be obtained at a low rate. The average length of ride throughout the main system on a certain week day two years ago was 2.14 miles and the average receipts per passenger-mile 1.05 cents. About 25 per cent. of the total mileage is made by trailers. The cost of operating per motor-car-mile at that time was



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Spittelmarkt. This point is at the east end of Leipziger Strasse, and most of the cars for eastern part of the city pass through here

10.08 cents and the cost per trailer-car-mile 5.02 cents. The traffic on each line is carefully and regularly charted to assist the transportation department in arranging and selecting its schedules. Daily records of the temperature and weather conditions are also charted. For a number of years the company has paid over 8 per cent. dividend on about \$25,000,000 stock. Last year a dividend of 8 per cent. was paid.

The car shown in the photograph on page 162 is one used on the municipal line, but is typical of the double-truck car

used throughout the city. Of late years all of the cars ordered by any of the companies has been of the double-truck, semi-convertible type. The single-truck car shown in the foreground of the illustration on the cover of this issue and the double-truck car just referred to, are the two principal types used in Berlin and weigh, fully equipped, respectively about 18,700 lbs. and 28,600 lbs. The older types of Berlin cars have large windows with stationary lights and a center window, which alone is adjustable. The double-truck cars ordered during recent years are all of the semi-convertible type and have individual windows which lower into pockets into the side walls. The platforms are long and intended to hold seven passengers on the front platform and eight on the back platform; no passengers are allowed to stand inside the car. The reversible transverse seats with which these cars are furnished accommodate twenty-four passengers. Owing to the narrowness of the car the aisle is placed at one side of the center, and the seats on one side of the aisle hold only one person. Other interesting features of this car are the head lights and marker lights which are carried on the hood, the ventilator on the end of the monitor, the hose coupling through the upper part of the dash, the steel ladder at each side of each



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Typical double-truck semi-convertible car of the Berlin street railways



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of the car shown on the opposite page. Seating capacity, 24. No passengers are allowed to stand inside. The front platform accommodates seven standing passengers and the rear platform, eight

platform which give access to the roof, and the wheel fenders which completely surround each truck. The cars of every route receive a distinctive Arabic number if it is a city line, and a Roman number or letter if it is a suburban line. These symbols are not picked at random, but as nearly as possible neighboring numbers, chosen for lines operating in the same territory. Thus, lines "G" and "H" overlap one another for a considerable distance, so that most travelers can choose either route. The number assigned to each line is marked in black on the whitened glass discs of the end lantern alongside the destination sign of the cars. The numerals or letters are very large and therefore visible at a considerable distance.

Besides these end signs, each car carries two long non-illuminated side signs which bear a list of all important places on the route. Inside the car the passengers will notice a sign which gives still further details concerning the route,

together with the schedule, fare, riding regulations and running time between the terminals.

The car maintenance problem is greatly simplified by at least three important factors, namely: a highly efficient class of motormen, whose methods of running are under strict control; well-kept road beds, often semi-private, laid in clean level streets; and contiguity to the principal electric concerns, thereby eliminating the need for the home manufacture of many items. The motor and trailer cars are overhauled and painted in rotation, about every two years, when they go into the central shop for four or five weeks. Usually these shops take care of eighteen motor cars and eight to ten trailers at one time, although fifty cars could be handled. The motormen undergo an unusually thorough course of instruction before they are allowed to operate cars.

Besides the surface lines Berlin has the Elevated & Underground Electric Railway System which runs through the southern part of the city, furnishing fast and comfortable transportation from the center of the city to a number of the southern suburbs. The Ringbahn is a steam railway completely encircling the city. Motor omnibus lines are very numerous and traverse all of the important thoroughfares not served by the railways. They carry about one-fourth as many passengers as the combined street railway systems. Two years ago the Grosse Berliner Strassenbahn published some accident records which were of particular interest owing to the comparison made with accidents due to omnibuses. It was shown that the trackless omnibuses run over more pedestrians than the street cars. The accidents on surface cars have decreased since that time, although the traffic has grown considerably and there has been an increase in schedule speeds.

Much of the foregoing information has been obtained from articles which have appeared in the *Electric Railway Journal* during the last two years.

IMPROVED STREET CAR SERVICE*

THE NEAR-SIDE CAR

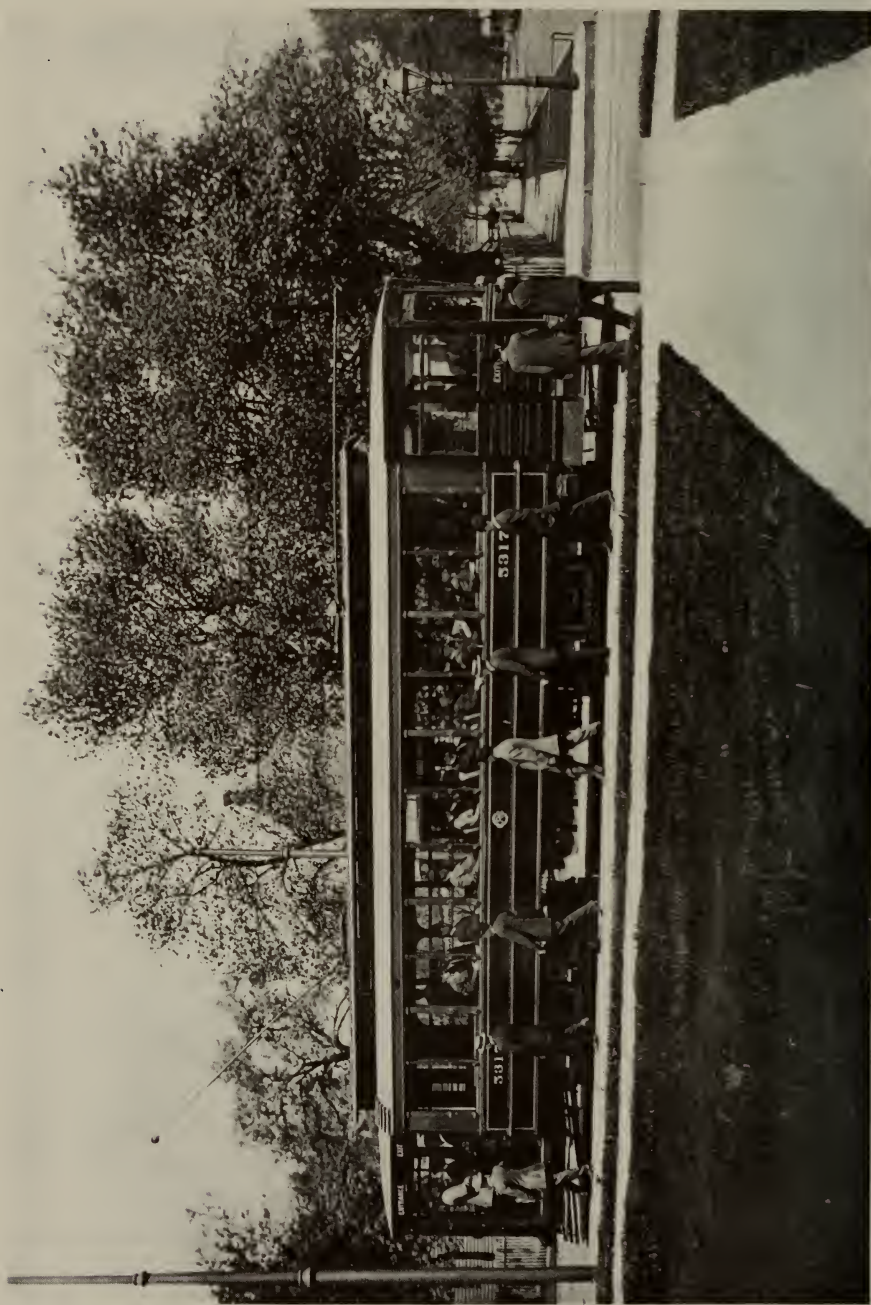
SCIENTIFIC management, when applied to the problem of transporting passengers upon street cars, should properly be directed toward the best method of securing

- (a) Maximum convenience and comfort of passengers.
- (b) Minimum possibility of accidents.
- (c) Increased comfort and efficiency of employees.

The pay-as-you-enter car, first used at Chicago in 1908, is distinguished from its predecessors by the collecting of fares by the conductor upon the rear platform. This car, as now generally adopted in the larger cities of this country, is provided with an entrance and exit upon the rear platform and an exit by way of the front platform. Under this arrangement all of the passengers are required to enter the car by way of the rear platform, and in actual practice about 70% of the passengers leave the car by way of the rear platform, as the front exit is found to be objectionable to many owing to the use of the front platform by smokers.

The traffic regulations of the police departments in the cities of Chicago, Philadelphia and Buffalo require that cars be stopped at the near side of the street for the purpose of taking on and discharging passengers, the result being that passengers are now obliged to leave the cross-walk and walk the entire length of car to secure entrance by way of the rear platform (Cut No. 1). This is often most objectionable, due to the muddy condition of the streets, and is productive of acci-

*A reprint of a pamphlet issued by The International Railway Company of Buffalo, N. Y. The first near-side cars were built by The J. G. Brill Company.



(Cut No. 1). Showing inability of conductor to see approaching passengers from his position on rear platform

dents because of the inability of the conductor to see approaching passengers from his position on the rear platform, the car frequently starting simultaneously with the prospective passenger coming into view of conductor. The consequence is that about 50% of the total accidents incident to the operation of street cars occur to passengers in the act of boarding or alighting from the cars.

As best illustrating the short-comings of the present method in this regard, an actual example of every day procedure at the hour of rush travel is here given:

From 5 to 15 or more passengers board the rear platform of a car at the near crossing of a principal street. The conductor then collects and registers the fares, makes change, issues transfers and when all passengers are aboard gives the starting signal to the motorman by means of a bell cord.

It is at just the moment of giving the starting signal that the principal weakness of the present method exists, as the conductor, at this particular moment, busily engaged in the collection of fares, must be sure before giving the starting signal that there are no passengers getting on or off the car by way of the rear platform. To give the go-ahead signal without being entirely sure that all passengers intending to take the car are safely aboard is productive of accidents, while, should the conductor hesitate unduly, car service upon the street must necessarily be delayed, as during the hours of maximum travel cars often follow each other through the down town terminal streets 20 seconds apart.

After the conductor has given the go-ahead signal the car does not immediately move forward, there being a perceptible interval of time consumed in conveying the thought to the mind of the motorman by means of the signal bell, and in energizing the motors by him through the medium of the electrical controller. This interval is often sufficient to permit the heretofore unseen passenger to appear and be in the act of getting on the car just as it starts.

By this example the conductor is shown to have too many duties to perform at the particular moment when the starting signal is given, and as at this time the motorman is at ease, waiting only for the starting signal, it is evident that a better distribution of effort would result if some portion of the conductor's duties at this moment could be delegated to the motorman.

Another and a particularly severe class of accidents is occasioned when stopping cars on the near side of the street, by passengers leaving the car by way of the rear platform and passing directly behind the car from which they alight and into the path of a car or automobile approaching from the opposite direction (Cuts Nos. 2 and 3). The passenger, when in this position, is at least 40 feet away from the cross-walk and so beyond the protection of the crossing policeman. The approaching car having made its stop on the opposite side of the street has consequently attained considerable speed, and, as the view of the motorman is obstructed by the standing car, serious and oftentimes fatal accidents result.

The work of both motorman and conductor has so changed during the last decade as to now make the motorman an expert operator of machinery, and the conductor an expert cashier, the duties of both being best performed when they are given proper protection from the weather. The present practice of conductors wearing heavy gloves and other bulky clothing necessary to their protection from the cold when in an exposed position upon the rear platform is not conducive to the most rapid and accurate performance of their duties.

Health Department requirements make necessary the stopping of smoking and spitting in street cars, and require a system of ventilation which should be automatic in character. The system in general prescribed is one which provides for the intake of fresh air over the electric heaters, insuring an even temperature during winter months, and the discharge of the foul air at the top of the car by means of ventilators.



(Cut No. 2). Leaving car by way of rear platform, and passing directly into the path of a car approaching from opposite direction



(Cut No. 3). Leaving car by way of rear platform, and passing directly into the path of automobile approaching from the opposite direction

This necessitates doing away with transoms in the monitor roof which are now used for the double purpose of intake and discharge of air.

The illuminated destination signs now in use seem to be inadequate to the extent that prospective passengers cannot determine the identity of the car when at a distance. This has best been remedied in European cities by the use of large numerals or letters to designate the different routes.

The result of this study leads to the conclusion that the use of the near side of the street by street cars for loading and unloading purposes, makes necessary the development of the front platform as the principal means of entering and leaving the car, and if the rear end of the car be used only as an emergency exit, the collection of fares by the conductor upon the front platform is at once made practicable.

The use of the front platform for both loading and unloading purposes makes possible a better division of duties between the motorman and conductor, in that the motorman may be given entire responsibility for the starting and stopping of the car and the safety of passengers boarding and alighting, the conductor's duties then being confined to the collection and registration of fares, issuance of transfers and calling of streets, thus avoiding much lost motion and minimizing the possibility of accidents.



(Cut No. 4). HB Life Guard in action

The improvements made possible by the adoption of this use of the front platform seem to justify its full development, thereby overcoming many of the defects of the present system. To that end the car now to be described has been produced, and will be hereafter referred to as The Near-Side Car.

THE NEAR-SIDE CAR

The entrance and exit are both by way of the front platform, enabling passengers to enter and leave the car directly at the cross-walk on the near side of the street.

Duties are equally divided between the motorman and conductor and each is rendered more efficient.

The Motorman is provided with a seat, and in the operation of the controlling devices, is protected from interference by a dividing rail. His vision is guarded against reflected light by means of an adjustable curtain. He controls the entrance and exit by a convenient lever, operating both the in and out folding doors and steps, separately or simultaneously, at will.

While the car is at a standstill, the motorman can plainly see the passengers entering and leaving the car and is thus able to act promptly and safely in operating the folding doors and steps, getting the car under way without the loss of time heretofore encountered through the necessity of waiting for the bell signal.

When the car is in motion passengers are not permitted to remain upon the platform. The motorman's attention is not, therefore, diverted as heretofore. This serves to more certainly assure his seeing persons signalling from the street and results in a greater alertness on his part in the avoidance of accidents by collision.

The Conductor is provided with a seat within a guarded space directly opposite the entrance to the front platform. In this position he is able to control the entrance passage into



(Cut No. 5) Entrance and exit at front platform only; passengers approach, enter and leave car directly under the motorman's eye

the body of the car, and is amply protected from the weather, so that he may, at all times, be clothed in a way best suited to the rapid performance of his duties.

When the car is at a stand still taking on passengers, the conductor has only to collect fares and issue transfers. This he is able to do much more rapidly than heretofore, as he is now relieved of the necessity of watching the step and giving the go-ahead signal. The entrance portion of the front platform will accommodate from ten to fifteen on-coming passengers, which, under these conditions, will be amply sufficient.

When the car is in motion, the conductor in either seated or standing position, is directly facing the passengers. Thus placed he can most readily observe the signals of those passengers who cannot conveniently reach the passenger's signal push button. Having no other duty to perform while the car is in motion, the conductor is able to call the streets as required, and as he is facing the passengers the names of the streets announced are much more easily heard and understood.

The exit at the rear end of the car, to be used in case of emergency or at points where the car is to be entirely unloaded, as at base ball games, etc., may be readily operated either from the rear end of the car or by the conductor from his position on the front platform.

Passengers alighting from a car by way of the front platform and passing across in front of it have a direct view of cars or automobiles approaching from the opposite direction. Should they desire to pass behind the car from which they alight they must necessarily await its forward movement. These conditions serve to prevent the accidents which have heretofore occurred because of passengers alighting from the rear end of a car and passing directly behind it and into the path of a car or automobile approaching from the opposite direction.

The ventilating system is automatic and, therefore, not dependent upon the action of conductor or the whim of



(Cut No. 6) Illuminated Route Letter, Destination and "Car Full" signs, HB Life Guard with Supplementary Wheel Guard, and Safety Grab Handle around car front

the passenger. The fresh air is brought in over the electric heaters, which are controlled by a thermo-stat guaranteed to automatically regulate the degree of heat, thereby insuring an even temperature during winter months. The foul air is discharged through nine registers placed in the ceiling directly over the seats. These registers are connected with ventilators placed at intervals on the roof of the car. The vacuum created by the motion of the car draws out the foul air with such rapidity as to insure an entire change of air within the car during each three and one-half minute interval, this being slightly in excess of the Health Commission requirements.

To provide against the inadequacy of the usual destination signs, a large illuminated white letter on black background occupies the upper half of the right-hand front vestibule window. This designates the route on which the car is running and is sufficiently large to be visible by day or night for a distance of several blocks. Supplementary thereto the side destination sign occupies the full length of the opening immediately over the entrance and exit doors at the curb side of the front vestibule. The car is also supplied with a "Car Full" sign, (Cut No. 6) which is to be dropped into place whenever the agreed number, constituting a maximum car load, has been taken on. (Cut No. 8.) This should prevent the extreme overloading of cars.

The H. B. life guard, adopted by the New York State Public Service Commission as being the best after severe competitive tests, when used in connection with the supplementary wheel guard, has shown an efficiency of 96% in the saving of life during six months' use in Chicago. This life guard has been adopted as standard, there being nothing as yet developed which seems to be its equal in efficiency.

The safety grab handle around the front vestibule (Cut No. 6) is so designed and placed as to be most readily seized by a person about to be struck by the car (see Cut No. 2) and should, in some instances, serve to prevent their being thrown thereunder.

The space heretofore occupied by the rear platform is in this car utilized for seating purposes, resulting in a largely increased seating capacity. (See Cut No. 7 and comparative figures shown on page 177).

The car as described operates ordinarily from one end only, necessitating the use of loops or wyies at the ends of lines. It is, however, so equipped as to permit of its being run in the reverse direction in case of blockades, or like emergencies. This single-end type of car permits the use of a non-reversible cross-seat, which, with the so-called semi-convertible type of construction adopted, results in a considerably increased width of aisle and length of cross-seat cushion without increasing the over-all width of the car.

Maximum traction center bearing trucks are used, permitting the use of two-motor instead of four-motor equipments. This accounts for the greatly reduced weight, and also reduces the height of car floor, with the result that the lower step of the car is carried 2 inches nearer to the ground.

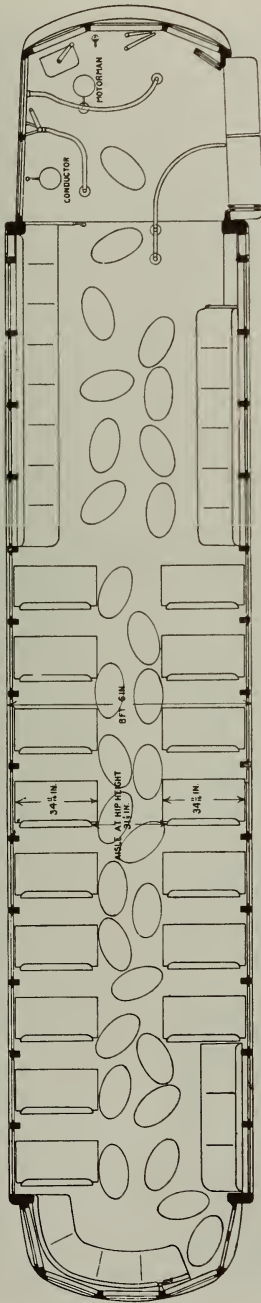
The efficiency of the motors and trucks here used has been proven by several months of test under Chicago winter conditions coupled with unusually severe schedule requirements.

The seating capacity, dimensions, weight, etc., of the near-side car, as compared with the present pay-as-you-enter standard, now used in Buffalo and Chicago, are as follows:

	Near-side Car.	Pay-as-you-enter Car.
Seating capacity	53	40
Length of cross-seat cushion	34 $\frac{11}{16}$ "	34"
Width of aisle, at hip height	31 $\frac{1}{2}$ "	27"
Width of car	8' 6"	8' 6"
Length of car, over all	45' 2"	45'
Height of car	12'	12' 5"
Height of lower step from ground	14"	16"
Weight of car, fully equipped	39,000 lbs.	52,000 lbs.



(Cut No. 7) Interior of Near-side car, with seated load of 53 persons, showing extra wide aisle and ventilating registers in ceiling



Floor plan of Near-side car. Maximum load 83 persons; 53 seated of whom 35 face forward; 30 standing passengers are represented by ovals occupying 12 inches by 18 inches each

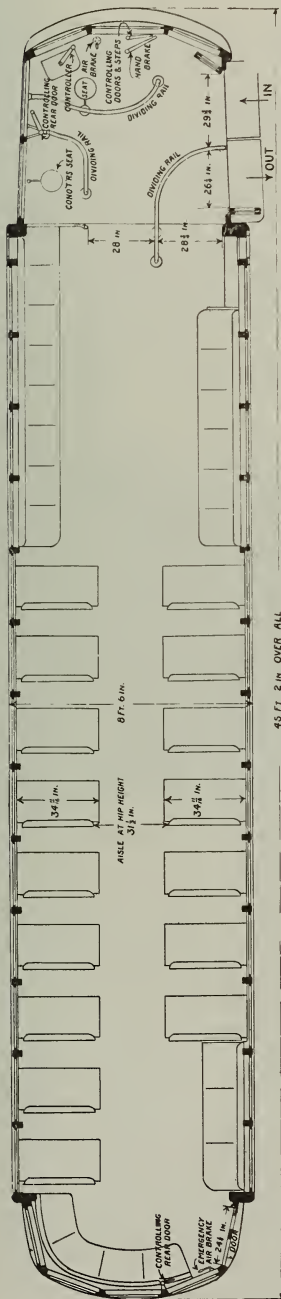


Floor plan of Near-side car. View shown is as though looking down upon passengers with top of car removed. Motorman and conductor are shown in position with passenger paying fare. The 30 standing passengers are occupying the same relative position and space as described by the ovals in the upper print

(Cut No. 8)



(Cut No. 9). Side view of Near-side car, showing high window openings and mushroom type ventilators



Floor plan of Near-side car. Seating capacity 53 persons, of which 35 face forward

NOTE—The "Near-side car" was developed under the personal direction of Mr. T. E. Mitten and the details were worked out by Mr. Ralph T. Senter, of Buffalo, N. Y.

Dr. W. A. Evans, Health Commissioner of Chicago, who is recognized as one of the foremost experts on ventilation, has given most valuable assistance in the development of the combined heating and ventilating system. The general excellence of this system of heat regulation and ventilation is approved by Dr. Francis E. Fronczak, Health Commissioner of Buffalo.

The Near-side car was developed primarily to meet the requirements of the New York State Public Service Commission, Second District, whose expert railroad inspector, Mr. Charles R. Barnes, has been most helpful by suggesting improvements in the detail of the car. The Commission following a careful inspection of the sample car, built for that purpose, has authorized the purchase of 35 of these Near-side cars which will be in operation at Buffalo, New York, in September of this year.

CENTRIFUGAL SPRINKLING CAR FOR DAVENPORT, IOWA

CAPACITY 4000 GALLONS

THE double-truck centrifugal sprinkling car illustrated was furnished this spring to the Tri-City Railway Company, of Davenport, Iowa, by The J. G. Brill Company, and is the first of this type used in Davenport. The Brill



CENTRIFUGAL SPRINKLING CAR FOR DAVENPORT, IOWA. A standard 4,000-gallon Brill Centrifugal Sprinkler (patented) mounted on Brill No. 27-GE2 trucks. The air brake cylinder is placed at the side above the car floor

centrifugal sprinkler, since its introduction in 1905, has been widely recognized as the most efficient sprinkling machine that has ever been devised, and, besides being used in various parts of the United States, has been supplied to railway systems in France, Spain, Italy, Japan and several cities in South America. Three centrifugal sprinklers were shipped this spring to the Rio de Janeiro Tramway, Light & Power Co., which company received six of the same type in 1908.

The discharge apparatus of the double-truck centrifugal sprinkler consists of a single pipe leading from the bottom of the tank close to a motor-driven centrifugal pump hung

at the center of the car, from which a direct piping connection is made along one side of the car to four sprinkling heads, one at each corner of the car. The pump is operated by a 20 h.p. motor, at a speed which furnishes pressure sufficient to sprinkle about 35 feet of roadway on each side of the car at the same time, with the sprinkling heads half open, which is their normal adjustment for the average street conditions. With the exception of the gate valves, there are but two valves in the piping, one on the suction pipe leading to the pump and the other on a connection between the delivery pipe and suction pipe. The latter is a special spring valve which opens automatically when the sprinkler heads are closed and prevents back pressure on the motor; it also serves to regulate the pressure, the amount of which is registered on the gage. A stopcock is provided for filling the tank under pressure and a fitting, located close to the pump port, for filling by suction. The gate valve near each sprinkling head enables the water to be cut off without altering the adjustment of the sprinkling heads. The sprinkling heads have a cylindrical slot for half the circumference of the head and a revolvable chamber with a corresponding slot. The amount and range of water are accurately and quickly controlled by hand wheels.

The tank is filled from plugs which the railway company had placed between the tracks at suitable intervals along the line, covered with manhole covers. A 15-ft. section of hose is used for this coupling.

Length over platforms . . .	31 ft. 0 in.	Diameter of wheels	0 ft. 33 in.
Diameter of tank	5 ft. 4 in.	Size of journal	0 ft. 4¼ in.
Length of tank	24 ft. 0 in.	Motors	West. 101-B—4-40 h.p.
Width over sills	7 ft. 6 in.	Wt. of car body, less elec.	
Extreme width	7 ft. 6 in.	equipment	22,000 lbs.
From track to sills	2 ft. 7⅞ in.	Wt. of electrical equip. . . .	1,100 lbs.
From sills over trolley boards	10 ft. 4 in.	Wt. of air brake equip. . . .	1,500 lbs.
From track to floor	0 ft. 21½ in.	Wt. of trucks	12,400 lbs.
Type of trucks	Brill 27-G2	Wt. of motors	11,000 lbs.
Wheel base	4 ft. 6 in.	Total weight	48,000 lbs.

THIRTY MORE P-A-Y-E CARS FOR VANCOUVER, B. C.

SINGLE-END TYPE

THE British Columbia Electric Railway Company has lately added to its equipment thirty new cars of the Pay-As-You-Enter semi-convertible type built by the American Car Company. The cars are for use on the Vancouver lines and are similar to the equipment described in BRILL MAGAZINE of January, 1910, except that instead of being arranged for double-end operation the new cars are controlled from one end only, as the lines on which they have been placed have loop terminals. Like their predecessors, the cars are mounted on Brill No. 27-G trucks.

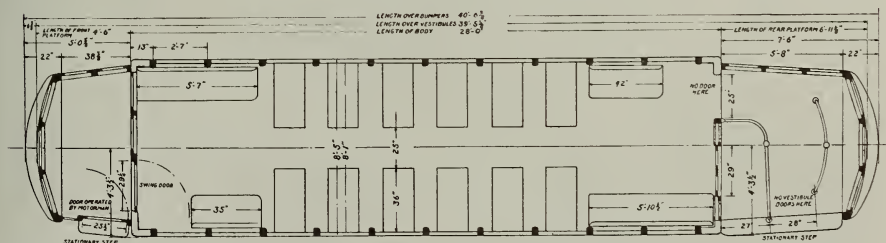


THIRTY MORE P-A-Y-E CARS FOR VANCOUVER, B. C. Interior of car looking toward rear platform. The entrance door is omitted between platform and car. The exit is provided with mutually-operated doors



THIRTY MORE P-A-Y-E CARS FOR VANCOUVER, B. C. The entrance and exits are on the left side, as the cars are run on the left-hand track. The cars are mounted on Brill No. 27-G1 trucks

The system of the British Columbia Electric Railway Company comprises about one hundred miles of track with about one hundred passenger cars in operation. A general description of the system was given in the January, 1910, issue of BRILL MAGAZINE. The new cars have the Brill standard semi-convertible window system and, as can be seen by the photographs of the interior, the right side of the car is equipped with high wire net guards as a protection to passengers from passing cars and vehicles, the window sills being extra low in this type of car. The lighting arrangement provides a lamp over every cross seat and a single row of lamps down the center of the car. The floor plan of the car shows the general features and it will be seen that the entrance and exits are on the left side of the car to provide for running on the left-hand track. The front platform has an exit at the



THIRTY MORE P-A-Y-E CARS FOR VANCOUVER, B. C. The front exit door is mechanically operated by the motorman. The seating capacity is 38

left side with folding door operated by the motorman. The rear exit has a pair of mutually-operating sliding doors in the body end, and no door is provided in the entrance from the platform into the car. The comparatively mild winters of Vancouver make it unnecessary to have a door in this opening. The rear platforms are arranged to accommodate standing passengers and are provided with

a railing to serve as a hand rail and also to form a passageway for on-coming passengers.

The principal dimensions and weights are as follows:

Length of body	28 ft. 0 in.	From step to platform . . .	14 in.
Length over platforms . . .	39 ft. 5½ in.	From platform to car floor .	8¼ in.
Length of front platform .	4 ft. 6 in.	Seating capacity	36
Length of rear platform . .	6 ft. 11½ in.	Type of trucks	Brill 27-G1
Centers of side posts . . .	31 ft. 0 in.	Motors	West. 101-B-2—2 40 h.p.
Width over sills	8 ft. 1½ in.	Weight of car body, less electrical equipment . . .	18,000 lbs.
Width over posts	8 ft. 5 in.	Weight electrical equipment including motors	10,000 lbs.
Extreme width	8 ft. 9 in.	Weight air brake equipment .	1,000 lbs.
From track to sills	2 ft. 8⅞ in.	Weight of trucks	12,000 lbs.
From sills over trolley b'ds	8 ft. 3⅞ in.	Total weight	41,000 lbs.
From floor to headlining . .	7 ft. 8⅞ in.		
From track to step	16⅞ in.		



THIRTY MORE P-A-Y-E CARS FOR VANCOUVER, B. C. Passengers are permitted to stand behind the railing at the rear of the platform

PAY-WITHIN CARS FOR CENTRAL PENN-
SYLVANIA TRACTION CO.,
HARRISBURG, PA.

BRILL PLAIN ARCH ROOF

SIX Pay-Within cars with the Brill plain arch roof and two cars of regular type with monitor roof were put in service last month on the lines of the Central Pennsylvania Traction Company at Harrisburg, Pa., and were built by The J. G. Brill Company. The Pay-Within cars are the first of this type to combine the Brill semi-convertible window system, plain arch roof and longitudinal seats. The four-part folding doors which close each side of the vestibules are



PAY-WITHIN CARS FOR CENTRAL PENNSYLVANIA TRACTION CO., HARRISBURG, PA. These are the first pre-payment cars to combine the Brill Semi-Convertible window system and longitudinal seating plan

divided into two sections, one section folding against the car body and the other against the vestibule corner post. The steps are arranged to fold in conjunction with the doors and are operated by a lever from the motorman's position. Six globe ventilators are placed along the center of the roof. The window sashes raise into pockets in the roof in the usual method of the builders. The underframing consists of 18-in. by $\frac{8}{16}$ -in. sill plates, reinforced with 3-in. by $\frac{1}{2}$ -in. plate at top and $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $\frac{3}{8}$ -in. angle at bottom;



PAY-WITHIN CARS FOR CENTRAL PENNSYLVANIA TRACTION CO., HARRISBURG, PA. Thirty-two passenger Pay-Within car with six-foot platforms. Mounted on Brill No. 39-E Trucks

the stringers and crossings are made of 4-in. channels and the end sills of 10-in. channels. The corner posts are $3\frac{5}{8}$ -in. thick and the side posts $2\frac{3}{4}$ -in.; sweep of posts, $3\frac{1}{2}$ -in.

The principal dimensions and weights are as follows:

Length of body	25 ft. 0 in.	Interior finish, cherry stained mahogany, seating cap.	32
Length over platforms	37 ft. 0 in.	Type of trucks	Brill No. 39-E
Length of platforms	6 ft. 0 in.	Truck wheel base	4 ft. 6 in.
Centers of side posts	3 ft. $0\frac{1}{4}$ in.	Diameter wheels	21 and 33 in.
Width over sills	7 ft. $7\frac{3}{4}$ in.	Size of journal	$3\frac{3}{4}$ and 3 in.
Width over posts	8 ft. 2 in.	Motors, GE-216—	2-50 h.p.
Extreme width	8 ft. $5\frac{3}{8}$ in.	Wt. of car body less electrical equipment	14,000 lbs.
From track to sills	2 ft. $7\frac{7}{8}$ in.	Wt. of electrical equipment	1,583 lbs.
From sills over trolley boards	9 ft. $0\frac{1}{4}$ in.	Wt. of air brake equipment	1,217 lbs.
From floor to headlining	7 ft. 9 in.	Wt. of trucks	10,000 lbs.
From track to step	0 ft. $16\frac{5}{8}$ in.	Wt. of motors	5,300 lbs.
From step to platform	0 ft. $14\frac{1}{2}$ in.	Total weight	32,100 lbs.
From platform to floor	0 ft. $8\frac{3}{8}$ in.		

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

**American
Car Company**

St. Louis, Mo.

**G. C. Kuhlman
Car Company**

Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

**Wason
Manufacturing Company**

Springfield, Mass.

**Danville
Car Company**

Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Mexico

International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Natal, Transvaal and Orange River Colony

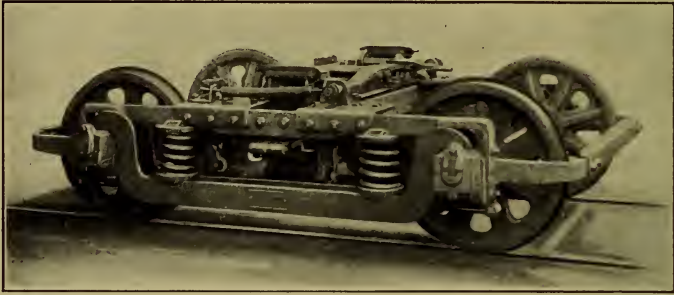
Thomas Barlow & Sons
Durban, Natal

Italy

Giovanni Checchetti
Piazza Sicilia, 1
Milan

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai



BRILL No. 27-M. C. B. TRUCK

The one-piece solid forged side frames which are a fundamental feature of this truck, provide greatest strength where it is most needed and make possible a transom, pedestal tie-bar and end-frame construction which insures permanent squareness and rigidity to the entire frame. Accessibility of the brake parts is an important feature secured by this frame. The bolster is made of a single steel casting. The truck is made for four sizes of journals, viz.; $3\frac{3}{4} \times 7$, $4\frac{1}{2} \times 8$, 5×9 and $5\frac{1}{2} \times 10$. It has been adopted by the Public Service Railway Co., of N. J., the Scioto Valley Traction, Boston Elevated Railway, Illinois Traction System, Lehigh Valley Transit, Philadelphia Rapid Transit (elevated system), New York & Long Island Traction, Northern Ohio Traction, Chicago & Joliet, British Columbia Electric and thirty other of the foremost railway companies.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



Church Street
Liverpool, England



THE BRILL CONVERTIBLE CAR

(Patented)

The window system is practically the same as in the Brill Semi-Convertible Car. Both panels and sashes slide into roof pockets. The sliding panels are made of two sheets of thin steel with air space between. The "Narragansett" Sill Step (patented) reduces the step heights of double-truck cars and does not alter the interior nor exterior width of the car.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



Wm Blair Macafer

PRESIDENT OF THE NORFOLK & PORTSMOUTH TRACTION CO., CENTRAL KENTUCKY TRACTION CO., BLUE
GRASS TRACTION CO., THE LEXINGTON RAILWAY CO., POMEROY & MIDDLEPORT ELECTRIC
CO., LEXINGTON UTILITIES CO. AND VICE-PRESIDENT AND GENERAL MANAGER
OF THE OHIO RIVER ELECTRIC RAILWAY & POWER CO.

BRILL MAGAZINE

Vol. V

JULY, 1911

No. 7

JOHN BLAIR MACAFEE

[WITH PORTRAIT INSERT]

JOHN BLAIR MACAFEE, organizer and manager of electric railway properties, was born July 4, 1861, at St. John, New Brunswick. He has lived in Philadelphia since childhood and is a graduate of the University of Pennsylvania and a member of the Philadelphia bar. He practiced law till 1892, when he became identified with public utilities and studied engineering. As president of the Riarton Construction Co., he built electric railways in New Jersey and was president of a line between Plainfield, Riarton, Bound Brook and New Brunswick. He became the president of the American Engineering Co., and built the Newton Electric Railway (Pa.), the Elmira & Seneca Lake Railway (N. Y.), and the Michigan Traction lines from Kalamazoo to Battle Creek and later was vice-president and general manager of the Railways Company General. In 1899 he built the Ohio River Electric Railway & Power Company's system and was identified with the building of the New Orleans & Pontchartrain Railway. Then followed the building of the Augusta & Aiken Railway, and, becoming president of that company, also controlled the Augusta & Georgia Railway & Light Co., and the Hampton Terrace Hotel & Land Co., which were under the same ownership. He also built the Blue Grass Traction Company's lines. Mr. McAfee is now president of the following electric railway companies: Norfolk & Portsmouth Traction, Pomeroy & Middleport, Central Kentucky Traction, Blue Grass Traction and Lexington Railway. He is vice-president and general manager of the Ohio River Electric Railway & Power Co., and president of the Lexington Utilities Co.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

LIVERPOOL*

LIVERPOOL, the second maritime city of the British Empire, is situated on the west coast of England, near the mouth of the River Mersey, long famous for its great shipping and ship-building industries. Its convenient geographical location for transatlantic travel, together with harbor and dock facilities that can scarcely be equaled, has made it one of the first maritime cities of the globe. Although given a population in excess of 700,000, its municipal boundaries comprise less than 24 square miles—a striking contrast to the extended area so characteristic of American cities. Across the Mersey, and directly opposite Liverpool, lies Birkenhead, a famous ship-building city of more than 120,000 inhabitants with which Liverpool is connected both by river ferries and by an electric railway tunnel.

Liverpool is pre-eminently a commercial city, the value of her export trade alone for the year ending July 1, 1909, having been \$726,000,000. A magnificent landing stage, nearly half a mile long and 80 feet wide, connected with the shore by means of nine bridges, affords perfect facility for the enormous transatlantic traffic of the port, although the average rise and fall of the tide is 11 feet, while the spring tides sometimes reach 30 feet. It is here that the huge ocean liners, as well as most of the numerous passenger steamers plying on the Mersey, dock. This section of Liverpool is known as the Pier Head and constitutes the traffic center of the city.

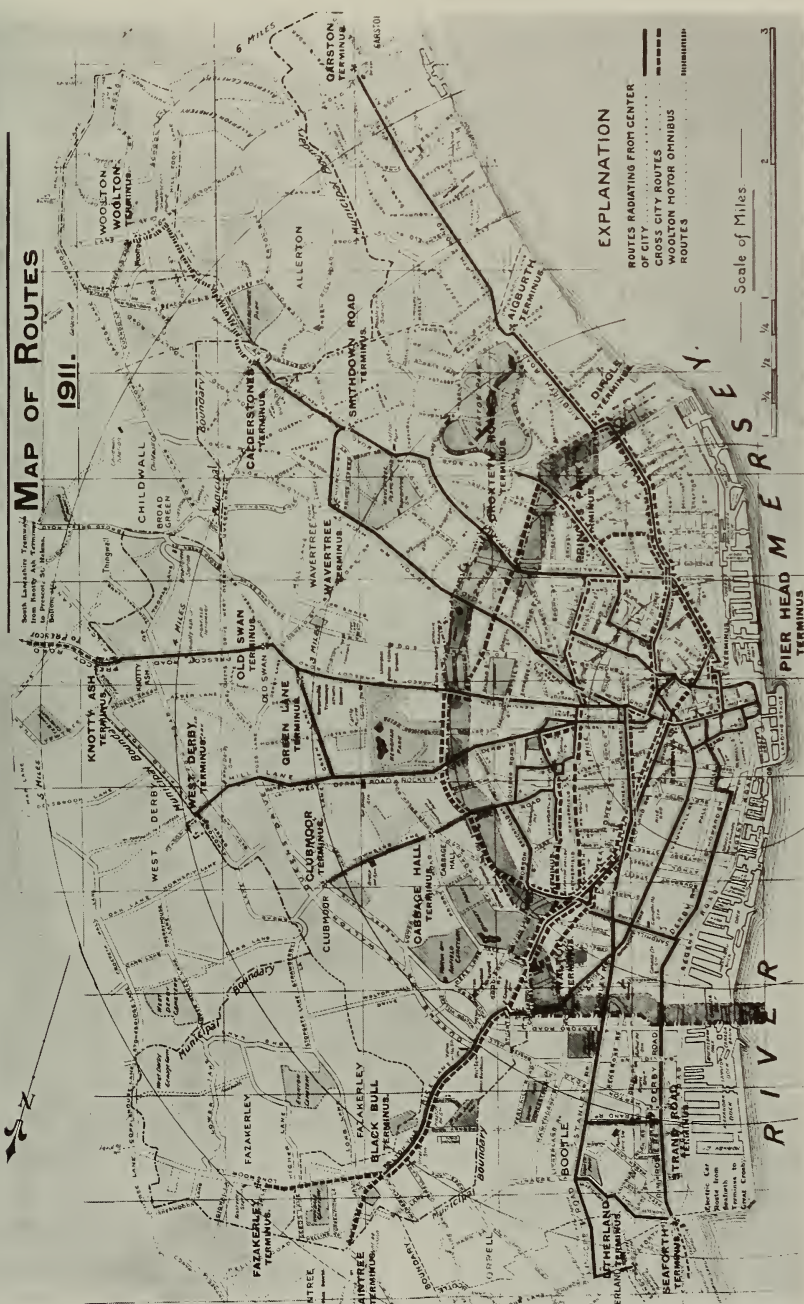
Within a radius of a mile of the Pier Head are located all of the great trunk line railway termini, public buildings,

* The thirty-first article of this series.

LIVERPOOL CORPORATION TRAMWAYS

MAP OF ROUTES

1911.



large commercial houses and leading hotels. This small and therefore extremely congested business center has presented a traffic problem of peculiar difficulty for the Liverpool transit lines. Here, within a most restricted area, intersected by a maze of the most irregular streets, many of which are narrow, the majority of the city lines converge in order to carry



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Pier Head Terminal of the Liverpool Corporation Tramways. Most of the lines radiate from this point

their passengers to and from the business center. As will be noticed on the accompanying map, nearly the entire railway system radiates from a given point—the Pier Head. These radial routes are intersected by some five cross-town lines which link the radial lines at the principal traffic points and afford access from north to south at varying distances from the center of the city. Although the congestion that naturally results from such a condition at the Pier Head must be most severe, it has been greatly obviated by the oper-

ation of through lines, thereby eliminating the transfer of passengers in this district. In the application of this system of internal transportation, local characteristics must be considered. While the American finds little objection to changing cars in order to reach his destination more expeditiously, the Briton, like other Europeans, is willing to wait for the car



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Lime Street at the intersection of London Road, showing St. George's Hall. This is the center of Liverpool

which will carry him through without change, thus balancing comfort against speed.

Some idea of the traffic problem that Liverpool has solved can be gained from the fact that of a total of 7936 cars running in and out of the city per day in the busy season, 6086, or more than 76 per cent., arrive and leave the Pier Head.

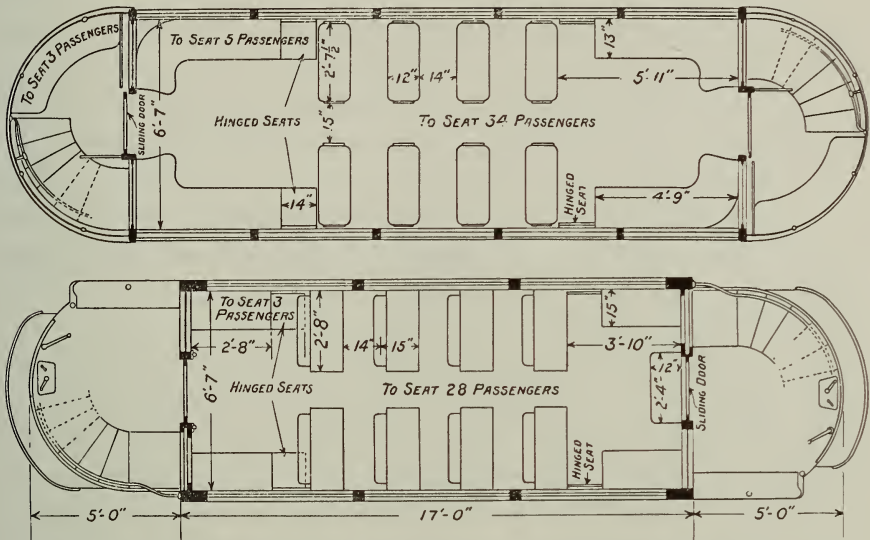
The electric street railways, or, as they are known in England, the tramways, are owned by the Liverpool Municipal

Corporation, which took over the Liverpool United Tramways & Omnibus Company in 1897, when the lines comprised about 67 miles of single track and were operated by horse traction. The lines were at once equipped for the overhead system of electric traction, and the first section was opened for service in November, 1898; and during the following three years the main bulk of the present system of tramways was completed. The total length of track at present operated is 123 miles, consisting of both double and single track routes, the last of which was completed May 18, 1903.

The rolling stock at present consists of some 561 cars, the average number in service being about 450. The standard cars are of the single-truck double deck type, with wheel base ranging from 6 feet to 7 feet 6 inches, the upper deck in the majority of cases being roofed in. The cars provide a seating capacity for 28 on the lower deck and 34 on the upper deck, with a total licensed capacity for 71 passengers, nine standing.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The standard car of the Liverpool Corporation Tramways. The upper deck is protected in stormy weather by window sashes at the sides and sliding roof panels. The car is mounted on the Brill No. 21-E Truck



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Upper and lower decks of the car shown on the opposite page. The Liverpool cars pass each other on the left side

A movable seat across either sliding door entrance which is not in use provides accommodation for two passengers. As the cars are operated on the left-hand track, they have the entrance and exit at the left and rear on one side only. The front gate is always closed.

The rear step is of sufficient width to admit two, but a heavy brass rod separates the space between them, which prevents crowding. The doors of the cars are only wide enough to admit one person at a time. On the upper and lower decks are signs stating the number of passengers which a deck will accommodate. The conductors become proficient in estimating the number of persons who have boarded a car, and when filled the iron gate is closed, indicating that there is no more room for passengers.

Until 1908, the cars were of one uniform type, when an experiment was made with what are termed "first-class" cars, which showed the advisability of reserving only the inside of the cars for first-class passengers, the upper deck being utilized for passengers at the usual prices. It is understood that

this system has become so satisfactory that applications have been received for its extension to all lines.

The majority of the cars are mounted on Brill No. 21-E trucks and equipped with two 25 h. p. motors, but the later type of cars are equipped with two 35 h. p. motors. The weight of these cars is 21,160 pounds unloaded. In addition to the cars, there is the usual complement of store cars, snow sweepers, etc. The rolling stock is at present housed in six car sheds situated in the various suburbs.

The lines have been constructed by the corporation's own staff, under direction of the city engineer. The rails, of standard gage, are laid on foundations of Portland cement concrete at least six inches in thickness, and are of the grooved girder pattern, weighing from 95 to 123 pounds per yard. The grades on the Liverpool lines are not severe, the steepest being about seven per cent., and the sharpest curve has a radius of 40 feet.

The overhead equipment consists of center poles, span wires with poles and rosettes and side bracket arms. The conductors are mainly .409-inch diameter and the main junctions are now largely equipped with automatic frogs.

The car building and maintenance works are situated at the north end of the city and cover an area of some 13,000 square yards, with a staff of about 430 men, including a building department staff which deals with the maintenance and minor alterations of buildings. The whole of the repair work for the cars is carried out at these works, the car sheds being utilized for storing, cleaning and examining only.

The capital that has been expended on the Liverpool electric tramways to the 31st of December, 1910, was \$9,932,655 and the total revenue for the year, \$2,977,765. The net profit, after having provided for interest and sinking fund, was \$491,330. The car mile earnings for 1910 amounted to 22.84 cents and the total charges to 20.264 cents per car mile. The average fare per passenger was 2.212 cents and the average length of the two-cent stage is about $2\frac{1}{2}$ miles. Since the

inauguration of the undertaking by the Liverpool City Corporation, the sum of \$2,841,115 has been transferred to the reserve, renewal and depreciation accounts in addition to the provision for interest and sinking fund and the sum of \$1,338,630 has been transferred to the city treasury.

It will be interesting to note that in 1897, the last year of complete horse traction, the maximum number of passengers was 3,700,000 as against 9,600,000, the maximum number of passengers carried in 1901, the first year of complete electric traction in Liverpool, while the maximum number carried during 1910 was 11,300,000. In addition to the surface lines, there is an elevated electric railway which skirts the bank of the Mersey, furnishing a convenient means of traversing the dock district.

A number of the surface lines radiating from the Pier Head have connections at their termini with lines extending into the country about Liverpool. These suburban lines furnish excellent means of communicating with the outlying districts of the city and nearby towns. The fares charged on all these suburban routes are low; for instance, the total fare from Pier Head to Garston and return, a ride of $23\frac{1}{2}$ miles and occupying about $2\frac{1}{2}$ hours, is 22 cents; the fare from Pier Head to West Derby and return, a ride of 9 miles and occupying about $1\frac{1}{4}$ hours, is 8 cents; and the excursion from Liverpool to St. Helen's, a ride of $17\frac{1}{2}$ miles, is made for 24 cents.

The outer circular belt route, which may be distinguished on the map, circumscribing the city, traverses a distance of 8 miles, upon which a fare of 8 cents is collected. This route carries one through representative sections of the whole city, thus affording a general view of the city and some of its suburbs, returning the passenger to the starting point.

All of the material and photographs from which this article has been prepared were obtained through the courtesy of Mr. C. W. Mallins, A. I. E. E., general manager of the Liverpool Corporation Tramways.

CLOSED TRAIL CARS FOR THE EMIGRATION CAÑON RAILWAY, UTAH

CENTER ENTRANCE

NEW closed trail cars have recently been added to the rolling stock of the Emigration Cañon Railway Company, Salt Lake City, to be used in its regular transit service. These cars are very similar in appearance and design to the type of trail car that is operated by the Denver City Tramway Company. Although its design differs from the types in common use by its center entrance feature, Denver, where they have been used for a number of years, reports that they have afforded entire satisfaction.

The center entrance has a width of 8 ft. 2 in. in all. This extra width over that of the motor car entrance is given the trailer entrance with a view of facilitating the loading and unloading, so that when stops are made, passengers on the trail car will not delay the starting of the train. The seating capacity of this type of trailer is 48 passengers, and when equipped with hand and air brakes, the car complete weighs but 9000 lbs.

As will be noticed on the accompanying illustration, the



CLOSED TRAIL CARS FOR THE EMIGRATION CANON RAILWAY, UTAH. 48-passenger trail car with body weighing only 9000 lbs. Mounted on Brill No. 57-D Trucks



CLOSED TRAIL CARS FOR THE EMIGRATION CANON RAILWAY, UTAH. The upper sashes are stationary and the lower sashes drop into wall pockets. The single wide side entrance is protected with heavy duck curtains

extreme lightness of this car body has not been obtained by sacrificing any important structural members, but rather by carefully trimming all useless materials until there remained a mechanical structure of accepted design suitable for carrying the desirable number of passengers with the lowest possible dead weight per passenger. Also, this center entrance has the effect of distributing the passengers more evenly throughout the car, thus greatly expediting the process of loading and unloading.

The mild and equable climate with which this territory is favored, together with other local conditions, makes this an ideal type of trail car for this system. The line traverses a territory which attracts many tourists throughout the year, and it also carries many local residents who make their summer homes along the route.

The principal dimensions and weights of these cars are as follows:

Length over ends	37 ft. 0 3/8 in.	Height from floor to center of head lining	7 ft. 5 1/2 in.
Centers of side posts	2 ft. 8 7/8 in.	From track to step	0 ft. 16 1/2 in.
Width over sills, including sheathing	7 ft. 3 3/4 in.	Seating capacity	48
Width over posts at belt	8 ft. 2 in.	Type of trucks	Brill No.57-D
Extreme width	8 ft. 6 in.	Wheel base	4 ft. 6 in.
Height track to under side of side sills	3 ft. 3 1/2 in.	Diameter of wheels	0 ft. 33 in.
		Weight of car body	9,000 lbs.

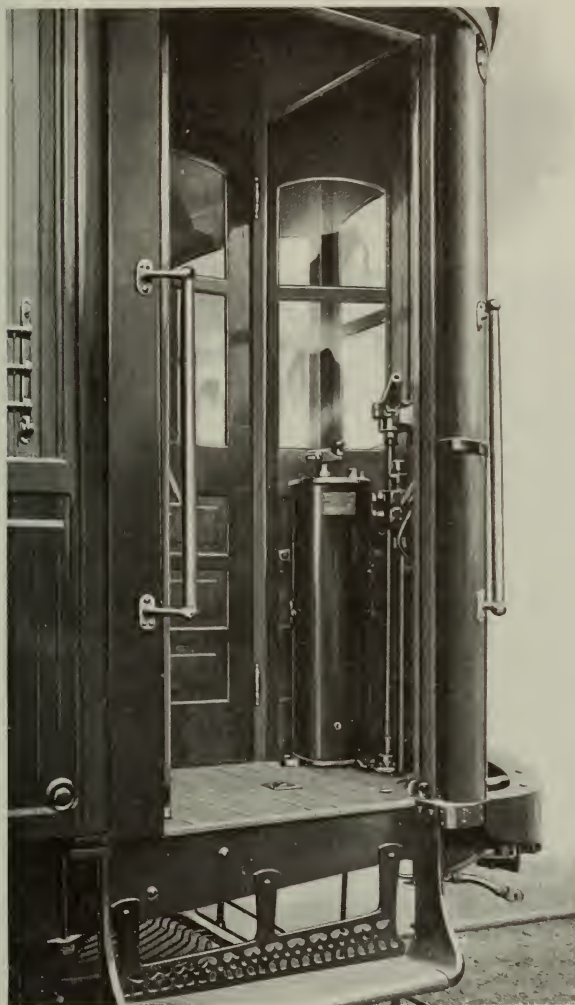


INTERURBAN CARS FOR
THE NORFOLK & SOUTHERN RAILROAD
BRILL No. 27-M.C.B. TRUCKS

FOUR handsome combination passenger and smoking cars of the Brill semi-convertible type have recently been built by The J. G. Brill Company for the Norfolk & Southern Railroad. These new cars have every convenience which this type of car makes possible, such as roomy seats, arm rests on the low window sills, a wide aisle, etc. They are equipped with controllers of type M, multiple unit system, and are intended for double-end operation, as both entrance and exit



INTERURBAN CARS FOR THE NORFOLK & SOUTHERN RAILROAD. The cars have the Brill Semi-Convertible window system and are mounted on Brill No. 27-M. C. B. Trucks



INTERURBAN CARS FOR THE NORFOLK & SOUTHERN RAILROAD. The cars are equipped for train operation. A motorman's cab is formed by a partition with door which divides the platform

may be had from either platform; however, only one side of the front platform can be used for this purpose, as the motorman's cab prevents passengers from using the right hand step to this platform. The motorman's cab has been placed on each platform at diagonal corners of the car. Each platform has folding vestibule doors and the motorman's compartment is formed by a partition extending longitudinally from the center of the end sill, the length of the swinging door,

which in itself constitutes the longitudinal portion of the partition. From this point the partition is carried at an angle to the post between the first and second windows on the right hand side of the dasher. This gives the motorman exclusive use of the right hand window. The door may be swung to the front and secured, thereby

completely housing the controlling apparatus when not in use.

The smoking compartment is equipped with longitudinal seats, which, like the transverse seats in the other compartment, are of Brill manufacture. Hand poles, complete with hand straps, extend the full length of the smoking compart-



INTERURBAN CARS FOR THE NORFOLK & SOUTHERN RAILROAD. The passenger compartment seats 40 and the longitudinal seats in the smoking compartment accommodate 12

ment on each side of the car. The compartments are separated by a wood and glass partition in which there is a single sliding door.

The body corner posts are of white oak $3\frac{5}{8}$ in. thick and the side posts are of the same material, $3\frac{1}{4}$ in. thick. The bottom framing has side sills 4 in. by $7\frac{3}{4}$ in. plated with 15 in. by $\frac{3}{8}$ in. steel; the end sills are $5\frac{1}{4}$ in. by $6\frac{7}{8}$ in. and the crossings are $4\frac{1}{2}$ in. by $5\frac{1}{2}$ in. The roof is of the clere-

story pattern, extending over the hoods in steam car style, with 14 ventilator sashes on each side. The roof is strengthened with concealed steel rafters $\frac{5}{8}$ in. thick which are forged to the shape of the roof in a solid piece. There are nine transverse seats 37 in. long on each side of the passenger compartment and two longitudinal corner seats. The window rods on each side of the car are hinged to drop down. A switch cabinet lined with transite is placed on the bulkhead outside of the smoking compartment.

The Brill No. 27-M.C.B.1 trucks have standard A.E.R.A. E. B. 1 axles, $5\frac{1}{2}$ in. in diameter at motor bearings, 6 in. at gear seat and $5\frac{1}{8}$ in. at wheel seat. The wheels have a tread of $3\frac{1}{2}$ in. and the flange is 1 in. by $\frac{1}{8}$ in. Both motors on each car are mounted on one truck, this truck being placed underneath the smoking compartment. The trailer truck, however, has suspension bars, etc., for the accommodation of motors if desired.

The points reached by this line, Cape Henry and Virginia Beach, indicate a large excursion business, and it is probably on this account that this type of car was chosen. Virginia Beach, one of the most attractive and best patronized resorts on the coast, is 18 miles east of Norfolk and has a beach that is unsurpassed in the country. The Norfolk & Southern Railroad Company was chartered on April 28, 1910, as successor to the Norfolk & Southern Railway. It operates over 600 miles of track, of which about 48 miles, between Norfolk, Cape Henry and Virginia Beach, are equipped for electrical operation. In May, 1910, its electrical rolling stock consisted of 18 motor passenger cars, 14 trail passenger cars, 5 freight cars and 2 electric freight engines.

The principal dimensions of these cars are:

Length of body	36 ft. 0 in.	Width over posts	8 ft. 6 in.
Length over platforms	45 ft. 5 in.	Extreme width	8 ft. $9\frac{3}{8}$ in.
Length of platforms	4 ft. $3\frac{1}{2}$ in.	From track to side sills	2 ft. $11\frac{3}{8}$ in.
Length of smoking comp't	8 ft. 8 in.	From side sills over trolley boards	9 ft. $4\frac{1}{8}$ in.
Centers of side posts	2 ft. 8 in.	From floor to headlining	8 ft. 5 in.
Width over sills	8 ft. 6 in.		

From track to step	0 ft. 18 3/8 in.	Type of motors	GE-205—2-75 h.p.
From step to platform . . .	0 ft. 15 1/2 in.	Wt. of car, less elec. equip.	22,500 lbs.
From platform to floor . . .	0 ft. 8 1/8 in.	Wt. of electrical equip. . .	2,800 lbs.
Seating capacity	52	Wt. of air brake equip. . .	1,900 lbs.
Type of trucks	27-M. C. B. 1	Wt. of trucks	16,000 lbs.
Wheel base	6 ft. 6 in.	Wt. of motors	7,200 lbs.
Diameter of wheels	0 ft. 34 in.	Total weight	50,400 lbs.
Size of journal	0 ft. 4 1/4 in.		



PAY-WITHIN CARS FOR BEAUMONT, TEX.

BRILL SEMI-CONVERTIBLE WINDOW SYSTEM

A NUMBER of Pay-Within cars, built by the American Car Company, have recently been added to the equipment of the Beaumont Traction Company. As is seen in the accompanying illustration, this car provides for



PAY-WITHIN CARS FOR BEAUMONT, TEX. The bulkheads are omitted, as is usual in the Pay-Within type. Seating capacity, 36

entrance at the rear and exit in front, with folding doors and steps, which are operated simultaneously by air. The interior is finished in oak and the seats are upholstered in cane and have corner grab handles. A horizontal railing between a pair of stanchions separates the platform into a position for the conductor and a passageway for entering and leaving passengers.

The conductor

collects fares over this railing and opens and closes the doors from a standard having an operating handle and located on the platform near the end sill. The conductor faces toward the rear, and when operating the door turns and moves the handles with his left hand. His position enables him to bar the exit with his left arm if necessary. It is not intended to use this rear exit except when the car is crowded, as it will be the endeavor to have passengers move to the forward end and leave by the front door. The word "exit" is therefore omitted at the rear platform. Passengers are permitted to enter at both sides of the stanchion at the rear platform at congested traffic points if necessary to expedite loading.



PAY-WITHIN CARS FOR BEAUMONT, TEX. The folding doors and steps are operated simultaneously by compressed air with controlling handle on a standard located on the platform near the end sill



PAY-WITHIN CARS FOR BEAUMONT, TEX. Large double-sash windows raise into pockets in the side roofs. The cars are mounted on Brill No. 27-G1 Trucks

The Beaumont Traction Company in May, 1910, operated 12 miles of track with an equipment of 20 motor cars. The city of Beaumont has a population of about 25,000 and is located at the center of the principal Texas oil fields.

The principal dimensions of this car are:

Length of body	25 ft. 4 in.	From track to side sills	2 ft. 9 ¹ / ₈ in.
Length over platforms	37 ft. 4 in.	From floor to headlining	8 ft. 4 ¹ / ₂ in.
Length of platforms	6 ft. 0 in.	From track to step tread	0 ft. 16 ¹ / ₈ in.
Centers of side posts	2 ft. 8 in.	From step tread to platform	0 ft. 14 ¹ / ₂ in.
Width over sills	8 ft. 2 in.	From platform to car floor	0 ft. 9 ⁵ / ₈ in.
Width over posts	8 ft. 2 in.	Seating capacity	36
Extreme width	9 ft. 0 in.	Type of trucks	Brill 27-G1
From side sills over trolley boards	9 ft. 6 ⁹ / ₈ in.	Motors	GE-67



FREIGHT AND PASSENGER CAR

PLATFORMS AND CONTINUOUS FOLDING SEATS

AN interesting type of baggage and express car built by The J. G. Brill Company has recently been put into service by the Hummelstown & Campbelltown Street Railway. The design of this car is particularly well adapted to conditions in the section which this line traverses. It is a

dairy farming district from which the various towns along the route of this railway obtain their supply of milk. From this district also is derived the large supply of milk required in the well known chocolate manufacturing industry of Hershey, one of the towns reached by this line. However, this district has also a large and increasing industrial population, which, together with other conditions mentioned, indicates the utility of this particular design of car.

As will be noted on the accompanying illustrations, this car has vestibuled platforms and bulkheads at both ends, which is a departure from the usual design of baggage and express cars. This construction well adapts the car for use as a smoker or for a special workingmen's car. The platforms are level with the car floor and double steps are therefore provided. Seating accommodation for passengers has been provided by continuous folding benches along both sides. These seats are of the longitudinal variety, and when not in use may be folded against the walls. A novel feature in their arrangement is the fact that the space occupied by the sliding side doors is also utilized for seating passengers by hinging folding seats thereto, which, when folded, slide with the doors into door pockets. There is a bulkhead in which there are mutually operating sliding doors at each end of the car, sepa-



FREIGHT AND PASSENGER CAR. End entrances and folding seats equip this car for passenger service when not employed in carrying freight. Mounted on Brill No. 27-G1 Trucks



FREIGHT AND PASSENGER CAR. The seating capacity is 48. The seats against the sliding side doors are hinged and fold up like the rest, the door pockets being large enough to admit them

rating the platforms from the interior. From the interior arrangement of this car it will be seen that it may be used to transport workmen to and from their places of employment and to carry baggage and freight.

The principal dimensions and weights of this type of car are as follows:

Length of body	31 ft. 0 in.	Type of trucks	Brill No. 27-G1
Length over platforms	41 ft. 8 in.	Wheel base	4 ft. 6 in.
Length of platforms	5 ft. 4 in.	Diameter of wheels	2 ft. 9 in.
Centers of side posts	2 ft. 6 in.	Size of journal	3 3/4 in.
Width over sills	8 ft. 2 in.	Motors	West. 101 B-2—4-40 h.p.
Width over posts	8 ft. 2 in.		
Extreme width	8 ft. 3 3/4 in.	Wt. of car body less electrical equipment	16,500 lbs.
From track to sills	2 ft. 9 3/8 in.	Wt. of electrical equipment	1,580 lbs.
From sills over trolley boards	9 ft. 7 5/8 in.	Wt. of air brake equipment	2,600 lbs.
From floor to headlining	8 ft. 6 1/4 in.	Wt. of trucks	12,000 lbs.
From track to step	16 1/4 in.	Wt. of motors	10,920 lbs.
Two steps to platform, each	12 1/2 in.	Total weight	43,600 lbs.
Seating capacity	48		

LARGE OPEN CARS FOR ASBURY PARK, N. J.

BRILL 22-E TRUCKS

THREE 15-bench open cars, built by The J. G. Brill Company, were delivered early this season to the Atlantic Coast Electric Railway for service in Asbury Park and vicinity. These new cars are uniform in design and construction with the majority of the open cars now in service over the lines, the car bodies of which were manufactured by the John Stephenson Company. When it is considered that the permanent population of Asbury Park is but 5,000 and the summer population exceeds 100,000 annually, the conditions which have called for this type of car are easily understood. In addition to this large population in Asbury Park must be considered also the summer population of the nearby resorts of Long Branch, Elberon, Deal, Allenhurst, Bradley Beach, Neptune City, Avon, Belmar and Spring Lake, points on the route of the Atlantic Coast Electric Railway. A very favorable operating condition is in the fact that there is not a single grade in the entire railway system, as the land on which these towns are



LARGE OPEN CARS FOR ASBURY PARK, N. J. 15-bench car with seating capacity of 75.
Mounted on Brill No. 22-E Trucks

built is singularly level. This permits large capacity cars to be carried on single-motor trucks equipped with motors of only 35 h. p. each.

These cars are mounted on single-motor trucks of the Brill 22-E type. The Brill patented round-corner seat-end panels contain curtain grooves which continue the post grooves, thereby permitting the curtains to be drawn to the floor as well as strengthening the side posts at these points. The ceilings are of 3-ply bird's-eye maple veneer. The bottom framing has $4\frac{3}{4}$ -in. by $7\frac{3}{4}$ -in. side sills plated on the outside with 10-in. by $\frac{5}{8}$ -in. steel, and the upper structure has bulkhead posts $3\frac{5}{8}$ -in. and side posts $2\frac{3}{4}$ -in. in thickness. Guard rails which slide between the posts and grab handles on each side of the car are made in two sections, and when raised are held under the water board by gravity catches.

In addition to these open cars, The J. G. Brill Company is now delivering to the same company three 28-ft. vestibuled closed cars of standard design. These cars are mounted on Brill 27-G1 trucks and have transverse seats of the "Winner" type, with the usual longitudinal corner seats, providing a seating capacity of 40 persons. Each car has double-sash windows, with the upper sash stationary; the lower sash can be dropped into pockets in the side walls. These cars are also uniform in design with others now in service on this company's lines.

The principal dimensions and weights of the open cars are as follows:

Length of body	34 ft. 4 in.	Wheel base	4 ft. 0 in.
Length of platforms	4 ft. $5\frac{1}{8}$ in.	Diameter of wheels	33 in. and 20 in.
Centers of side posts	2 ft. 7 in.	Motors	GE-67—2-35 h.p.
Width over sills	6 ft. $7\frac{7}{8}$ in.	Wt. of car less elec. equip.	13,140 lbs.
Width over posts	7 ft. 3 in.	Wt. of electrical equipment	880 lbs.
From track to step	20 $\frac{7}{8}$ in.	Wt. of trucks	7,480 lbs.
From step to floor	17 in.	Wt. of motors	4,200 lbs.
Seating capacity	75	Total weight	25,700 lbs.
Type of trucks	Brill No. 22-E		

COAL CARS FOR PHILADELPHIA RAPID TRANSIT COMPANY STEEL UNDERFRAMES

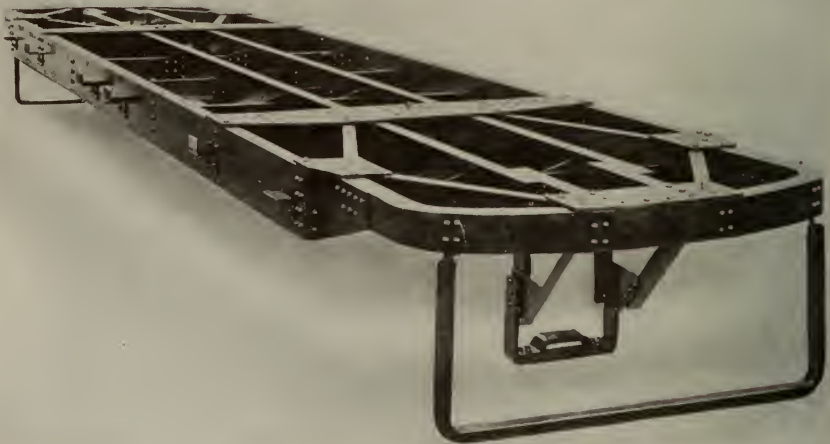
THE engraving shows one of four coal cars mounted on motor trucks, lately delivered to the Philadelphia Rapid Transit Company. The center and the side sills are 12-in. channels and the side sills have $3\frac{3}{4}$ by $5\frac{3}{4}$ -in.



COAL CARS FOR PHILADELPHIA RAPID TRANSIT COMPANY. These powerfully built cars have steel underframes and have a capacity of $37\frac{1}{2}$ cubic yards

yellow pine sub-sills extending the full length of the channel on the outside and supported on the channel by Z-shape brackets $7\frac{1}{2}$ -in. wide by $\frac{5}{16}$ -in. thick, six on each side. The crossings consist of 5-in. channels set between the side and intermediate sills and connected to each sill with 3 by 3 by $\frac{3}{8}$ -in. angles. At each end of the car, beyond the bolster and extending from bolster to cross-tie and from cross-tie to end of center sills, are diagonal braces made of $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{1}{4}$ -in. angles secured by steel gusset plates. The bolsters are built up of $\frac{1}{2}$ -in. steel web plates with $3\frac{1}{2}$ by $3\frac{1}{2}$ by $\frac{5}{16}$ -in. top and bottom flange angles on each side of

web. The bolster plates are connected to the center sills by 4 by 4 by $\frac{3}{8}$ -in. angles and to the side sills by $3\frac{1}{2}$ by $3\frac{1}{2}$ by $\frac{3}{8}$ -in. angles securely riveted. The bolster top plate is 20 by $\frac{3}{8}$ -in. steel and the bottom plate 12 by $\frac{1}{2}$ -in. A malleable filler casting is placed between the center sills at the bolster, and the body side bearings are each built up of two malleable iron braces, one on each side of the web, to which is attached the curved malleable iron wear plate. The bumpers



COAL CARS FOR PHILADELPHIA RAPID TRANSIT COMPANY. The brackets on the side sills support yellow pine sub-sills

are made of 6 by 4 by $\frac{3}{8}$ -in. angles, bent to shape in one piece and extending back to the side sills to which they are secured with 12 by $\frac{1}{2}$ -in. steel plates.

The principal dimensions and weights of these cars are as follows:

Length of body	25 ft. 6 in.	Motors	GE-80—4-40 h.p.
Length over platforms . . .	33 ft. 6 in.	Wt. of car body less elec. equipment	16,180 lbs.
Length of platforms	4 ft. 0 in.	Wt. electrical equipment . .	1,250 lbs.
Width over posts	7 ft. $5\frac{3}{4}$ in.	Wt. of air brake equipment . .	1,500 lbs.
From track to sills	3 ft. 0 in.	Wt. of trucks	20,000 lbs.
From sills over trolley boards	8 ft. 0 in.	Wt. of motors	11,500 lbs.
Capacity	$37\frac{1}{2}$ cu. yds.	Total weight	50,430 lbs.
Wheel base of each truck . .	6 ft. 4 in.		

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

**American
Car Company**
St. Louis, Mo.

**G. C. Kuhlman
Car Company**
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

**Wason
Manufacturing Company**
Springfield, Mass.

**Danville
Car Company**
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Mexico

International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Natal, Transvaal and Orange River Colony

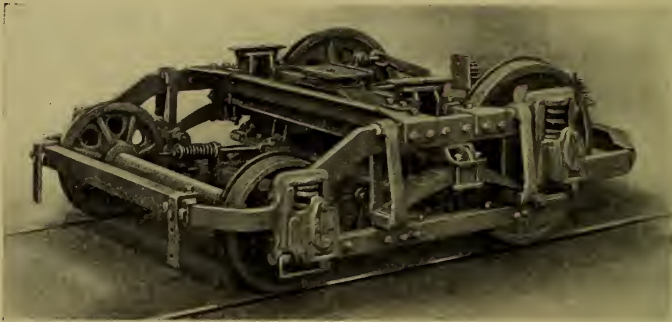
Thomas Barlow & Sons
Durban, Natal

Italy

Giovanni Checchetti
Piazza Sicilia, 1
Milan

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai



BRILL SINGLE-MOTOR TRUCK No. 39-E

It would at least be interesting to know what reduction in weight could be made in your next lot of city cars and trucks over the last, and we would be glad to figure it out for you. Of course it would be on the basis of using the above truck, for not only is it the lightest bolster truck built but the single-motor feature is an enormous saving in weight and the wide truck centers permit a lighter body construction. One road recently made some changes in body design, put the cars on these trucks and saved 30 per cent. over the last lot of rolling stock. What about riding qualities and the pony wheels sticking to the track? The answers are in the fact that the truck has been in use for more than three years in New York (both Third Avenue, and Metropolitan), Brooklyn, Philadelphia, Washington (both Capital Traction and Washington Railway & Electric), Richmond and Denver, and it is now operated on 65 different roads. For economy in power plant investment, power consumption, maintenance of electrical equipment and rolling stock investment, consider the Brill Single-Motor Truck No. 39-E and write for figures in weight reduction.

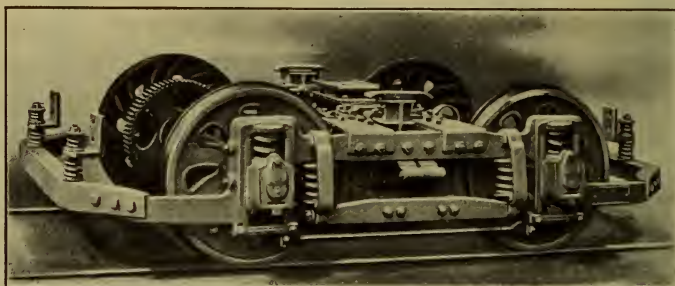
THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



Broadway
St. Louis, Mo.

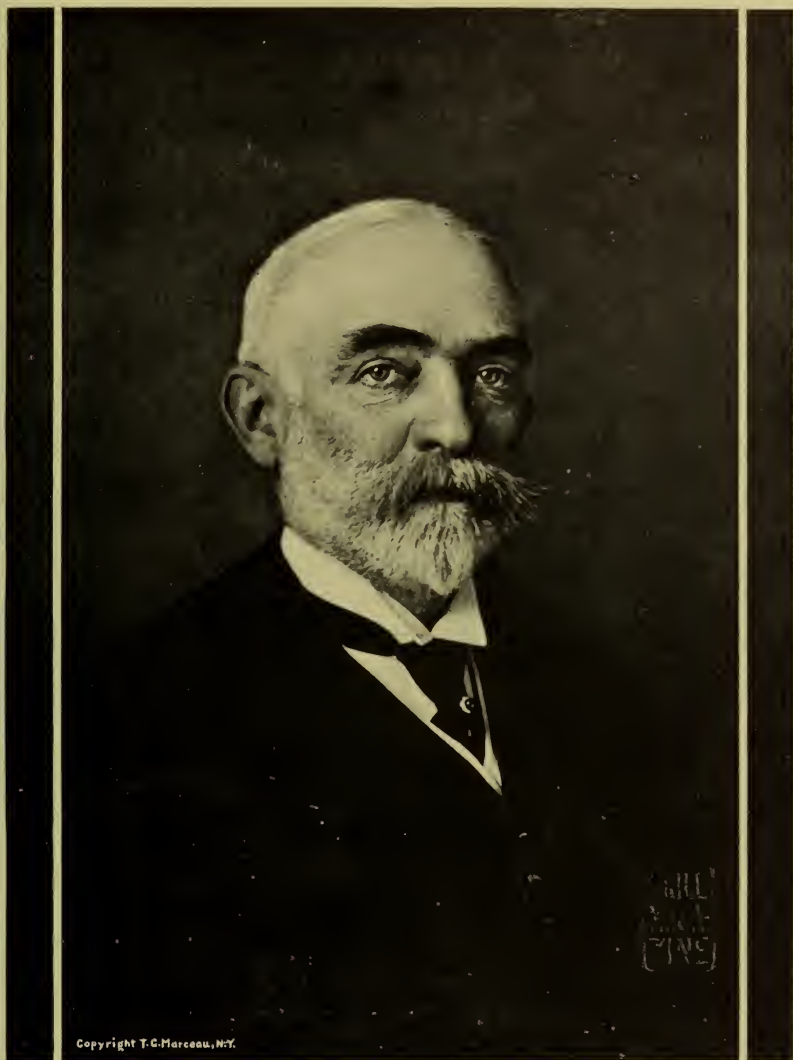
THE 1908 A.W. SANDERS



BRILL SHORT-BASE PIVOTAL TRUCK No. 27-F

This truck is specially designed for city and suburban service where sharp curves are met and the speed does not exceed 30 miles per hour. Three sets of springs give the truck its superior riding qualities and a cushioned lateral motion to the car body. The extending of the ends of the side frames and bending them around to give plenty of surface for attachment for the end angle crossings is a recently adopted improvement which simplifies the construction and increases the strength of the truck. Together with the transom gusset plates which are folded over the solid forged side frames, we believe that we have secured the most advanced method of connecting the side frames across the truck that has ever been accomplished. The Brill No. 27-F truck is used by the Northern Ohio Traction Company, Cleveland Railway Company, Georgia Railway & Electric Company, Syracuse Rapid Transit Company, Northern Texas Traction Company, Toledo Railway & Light Company, Long Island Railroad Company, Detroit United Railway Company and other important systems.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



FREDERICK W. WHITRIDGE

RECEIVER OF THE THIRD AVENUE RAILROAD COMPANY

BRILL MAGAZINE

Vol. V

AUGUST, 1911

No. 8

FREDERICK W. WHITRIDGE

[WITH PORTRAIT INSERT]

FREDERICK WALLINGFORD WHITRIDGE, Receiver of the Third Avenue Railroad Company, New York, was born in New Bedford, Mass., August 8, 1852. He graduated from Amherst College in 1874, and three years later received a master's degree from the same institution. The degree of LL.B. was received from Columbia University in 1878, and in 1909 Amherst conferred on him the degree of LL.D. He was admitted to the New York bar in 1879 and has practiced in that city ever since, devoting part of his time, from 1883 to 1888, to lecturing at Columbia University on administrative law, and on constitutional and political history from 1888 to 1894. He has also written much for the leading reviews on political and economic subjects. In 1906, on the occasion of the marriage of King Alfonso of Spain, he represented the United States as special ambassador. He was appointed receiver of the Third Avenue Railroad System early in 1908 and quickly brought order out of chaos, and in three years placed the property in excellent condition for reorganization. During his administration about five hundred new cars of a convertible type, now known as the "Third Avenue Type," were purchased, the prepayment method of fare collection was adopted for all cars, and storage battery cars were placed on the crosstown lines. Mr. Whitridge is a director of the Cataract Construction Co., Chicago Terminal Elevator Co., Cleveland, Akron & Columbus Railway, Washington County Railroad, Lake Erie & Western Railroad, Niagara Development Co., Niagara Falls Power Co., and others. He is a member of the Bar Association of New York, American Fine Arts Society, American Academy of Political and Social Science, New England Society, and others, and is a member of ten of the principal New York clubs.

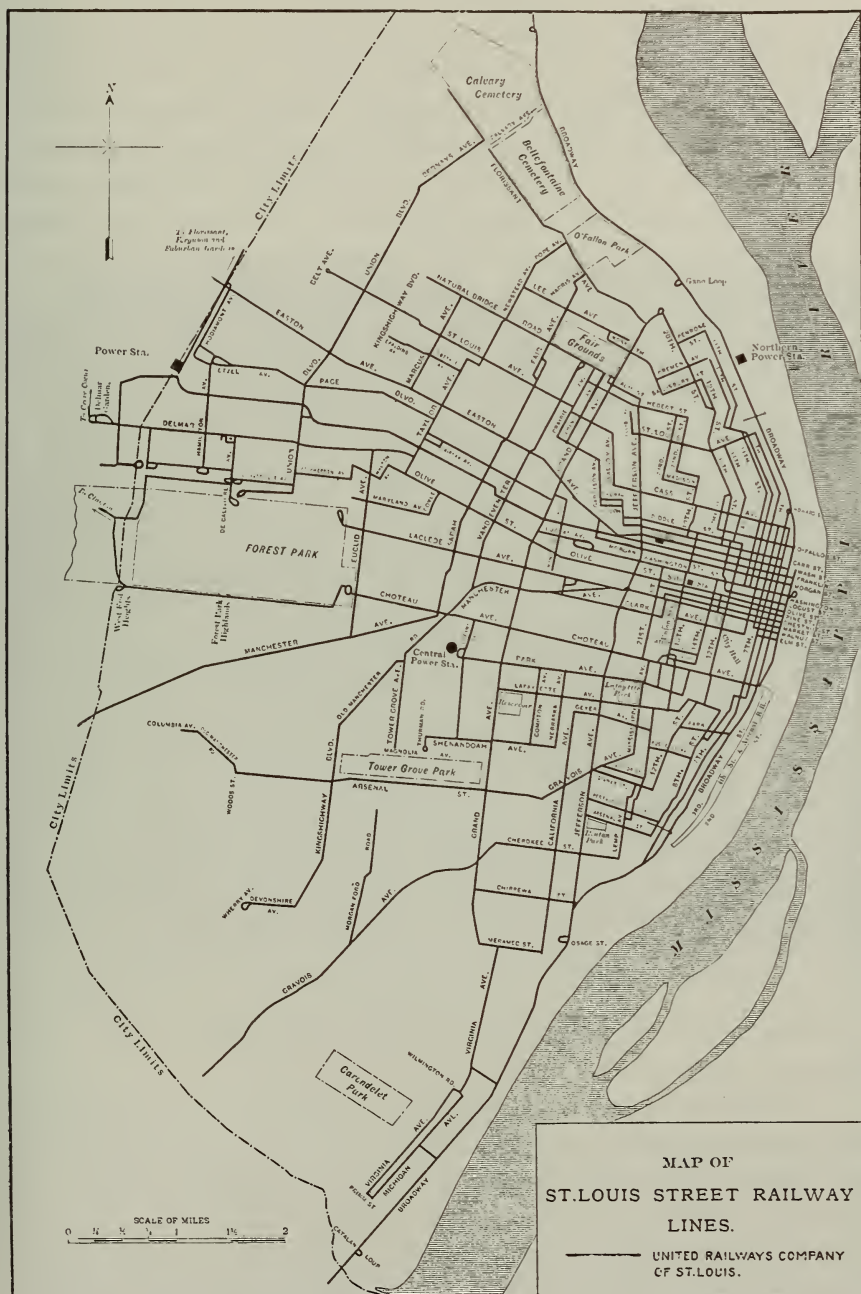
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

ST. LOUIS*

ST. LOUIS, with its population of three-quarters of a million, is the great central metropolis of the United States and the largest city west of the Mississippi River. Its location, on the west bank of the Mississippi a few miles below the confluence of the Missouri River and a short distance above where the Ohio River joins the "Father of Waters," puts the city in communication by water with a large part of the country. It is one of the greatest railroad centers in the world and has no less than twenty-four great trunk systems radiating to all parts of the continent. As a manufacturing city, St. Louis ranks among the first, and in many industrial branches takes the leading place among American cities.

The development of St. Louis has been of the radial type, commencing at the center of a long curve in the river shore, where the original town was established and which is now the business center, the population has spread out north, west and south. The excellent street railway service which St. Louis has had for fifty years and which has covered the period of its development from a small city to a great metropolis, has spread the population over a large area, and therefore the city has no crowded tenement house districts. The business part of the city being in a comparatively small area near the river, in which are located the offices of the many large factories, railroads, breweries and other industries which are along the river front and back in the various parts of the city, causes a great deal of traffic throughout the day between these points. The travel between the business section and the residential

* The thirty-second article of this series.



areas morning and night is remarkably heavy, as nearly every person employed in the business section must use the cars. On Sundays, holidays and evenings during pleasant weather the cars are used by an unusually large number of pleasure riders, and nearly every line reaches some kind of a resort. This pleasure riding has much to do with the large



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Broadway and Washington Avenue. This is the very heart of the business district

number of rides per capita, which was 488 for the year of 1910.

As the streets are of a generous width, nearly all the lines are double-tracked and have ample width between the tracks, and with long radius curves enable long and wide cars to be operated. The ground on which the city is built rises in three terraces from the river, the highest of which is 200 ft. above the level of the river. St. Louis is divided at its center by the

Mill Creek Valley, which runs east and west and through which all of the steam railroads enter the city. This valley is bridged at all the principal avenues running north and south with wide, substantial structures. The street railway lines, therefore, have no heavy grades. Most of the lines are from six to twelve miles in length, and there are several



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Sixth Street, looking north from Olive. Most of the railway system is double-tracked, as the streets are generally wide

longer divisions which run beyond the city limits to populous suburbs and resorts.

St. Louis has one of the most extensive public park systems of any city in this country. Forest Park is the largest and is situated centrally on the western boundary, and contains 1400 acres. There are two large parks in the southern part of the city and one in the northern part, besides fourteen others within the municipal limits. The long lines which run

out to the west of the city traverse a beautiful country and reach interesting points, one of them on the Missouri River, some twenty miles from the business center.

The entire railway system is operated by the United Railways Company of St. Louis. Formerly there were a number of independent companies whose lines paralleled and crossed each other in all directions. They also used each others lines. At the time the lines were electrified, several groups of these properties were consolidated, and in 1898 the United Railways Company was incorporated and acquired all of the operating street railways in the city, including the St. Louis & Suburban, which company was taken over in 1906. The Illinois Traction System now enters the city over its own bridge across the Mississippi to a terminus at Twelfth



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Olive Street, looking west from Ninth. This section is thickly covered with great office buildings, hotels and theaters

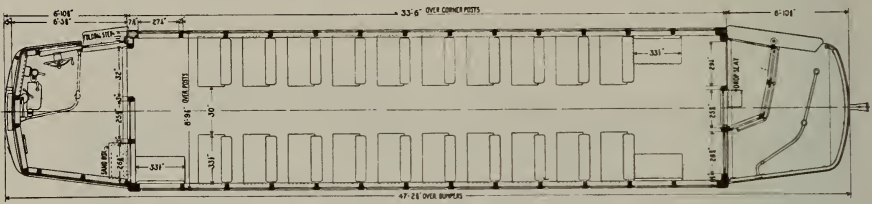


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The standard car of the United Railways Company is constructed of steel up to the window rail, is arranged for single-end operation and prepayment fare collection

Street and Lucas Avenue, near the heart of the business section.

St. Louis has always been progressive in street railway matters and has taken the lead in adopting advanced types of cars and trucks in several instances, and was the first to use large generators with direct connected engines, first to go in for cast welding of rail joints and first to use rails in 60-ft. lengths. During the World's Fair, held at St. Louis in 1904, the company carried, on the chief day of the Exposition, 1,151,785 persons without the severe congestion of crowds common to special occasions. On the opening day of the Fair, 1100 cars were operated, and throughout the entire period of the Exposition the transportation of the immense crowds for a distance of about five miles from the center of the city to the grounds was carried on without a hitch.

The standard car of the United Railways Company is of a character entirely in accord with this up-to-date organization and equipment. This car, which is shown in the photograph and diagram, was adopted early in 1909 and is designed for the Pay-As-You-Enter method of fare collection. It is built of steel up to the window rail, effecting a reduction in weight of 1000 lbs. in this construction over cars of a former design having an equal capacity. The side wall construction increases the interior width 8 in. beyond that of the former type.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Floor plan of car shown on preceding page. The motorman and his controlling apparatus are enclosed by a railing. The Pay-As-You-Enter platform at rear has a vestibule enclosing conductor and exit. Smokers are permitted to stand behind the railing which divides the open part

Structural steel shapes and plates are used for the bottom and sides, the main members consisting of the steel side plates, which are 26 in. high and $\frac{3}{16}$ in. thick. The plates are made in three sections to a side, with two angle irons riveted to the bottom at the inside, to which are secured the 4-in. I-beam cross sills. One angle iron is 8 in. by $3\frac{1}{2}$ in. by $\frac{1}{2}$ in., with its long side riveted to the 26-in. side plate; the crossings rest on the flange of this angle. The other angle, which is 3 in. by 4 in. by $\frac{3}{8}$ in., is also riveted to the side plate with its flange on top of the crossings, rigidly holding them against vertical movement. No center sills are used. The belt rails are $\frac{3}{16}$ in. steel specially rolled to enable them to be riveted to the side plates and fitted under the wooden window capping. The side posts all extend to the floor and each is fastened to the side plate by five $\frac{3}{8}$ -in. bolts.

The floor of the car is fireproof and consists of galvanized sheet iron placed on the I-beam crossings, over which tongue-and-grooved yellow pine is placed, and this floor is surfaced with a hard composition reinforced with wire netting. The surface composition has the appearance of red concrete and is brought up along the side plates to make a joint which will not catch dirt and can be easily washed. The window arrangement consists of a stationary top sash and a lower sash which raises its full height, leaving an opening $27\frac{1}{2}$ in. high by $27\frac{1}{4}$ in. wide.

As will be seen in the illustrations, the car is arranged for single-end operation, and the front platform has all the operating equipment in the right-hand corner, with a pipe railing

around this corner to prevent passengers from crowding the motorman. The rear platform is unusually interesting, as it has a small vestibule surrounding the conductor's position and exit door, leaving the rest of the platform open. A railing divides the open part and behind which smokers are permitted to stand. The climate of St. Louis is comparatively mild, and therefore an open rear platform is suitable. The vestibule, being small and close to the bulkhead of the car, relieves the platform of the weight which ordinarily is borne at the end of the long overhang. The vestibule is provided with three windows which drop into pockets. Many of the older cars have been rebuilt to include this style of rear platform.

The principal dimensions and weights are as follows:

Length of body over corner posts	33 ft. 6 in.	Seating capacity	46
Length over platforms	47 ft. 2 $\frac{3}{4}$ in.	Type of trucks	United Railways Co.
Length of platforms	6 ft. 10 $\frac{3}{8}$ in.	Wheel base	4 ft. 6 in.
Centers of side posts	30 in.	Wheels	33 in.
Width over sides	8 ft. 9 $\frac{7}{8}$ in.	Size of journal	4 $\frac{1}{4}$ in. by 8 in.
Extreme width	8 ft. 10 $\frac{3}{4}$ in.	Motors	G.E.216-A 4-50 h.p.
From track to side sills	32 $\frac{1}{8}$ in.	Wt. of car body less elec. equip., seats and stove . .	24,044 lbs.
From sills over trolley boards . .	9 ft. 6 $\frac{1}{4}$ in.	Wt. of electrical equipment . .	604 lbs.
From floor to headlining	8 ft. 6 $\frac{3}{8}$ in.	Wt. of air brake equipment . .	1,102 lbs.
From track to step	14 $\frac{7}{8}$ in.	Wt. of trucks	13,050 lbs.
From step to platform	13 $\frac{1}{2}$ in.	Wt. of motors	11,200 lbs.
From platform to floor	0 ft. 10 $\frac{1}{8}$ in.	Total weight	49,710 lbs.

The report of the United Railways Company for the year 1910 shows the following: Passenger revenue, \$11,373,465, an increase over the former year of \$467,320. The gross earnings and other income for 1910 were \$11,580,841. Operating expenses, depreciation and taxes, \$7,906,102, an increase over 1909 of \$877,924. After payment of the dividend on preferred stock in the hands of the public for the six months ending June 30, 1910, the surplus earnings for the year of 1910 were \$471,415. Total number of revenue passengers carried during the year were 230,691,532; transfer passengers, 104,904,281; total, 335,395,813, an increase of 14,840,732 over 1909. The trackage comprises 347 miles within the city limits and 109 miles outside of the city; total, 456. The rolling stock consists of 1400 cars.

P-A-Y-E EQUIPMENT FOR THE RICHMOND & HENRICO RAILWAY

BRILL No. 39-E TRUCKS

TWELVE 32-ft. closed cars of the Pay-As-You-Enter type have just been delivered to the Richmond & Henrico Railway by The J. G. Brill Company for operation over the company's lines in Richmond, Va. These cars are similar in construction and design to those furnished last year to the Richmond lines of the Virginia Railway & Power Company and described in BRILL MAGAZINE of October, 1910. The platform arrangement of the new cars indicates the mild climate of the territory in which they will be used by the fact that doors are closed on one side only of each platform, the other side being fitted with a folding gate. Provision, however, has been made for the attachment of folding doors if desired in the future. The gate that is used on this platform is 5 feet high, and when closed extends the entire length of the platform, the upright pipe stanchion on the platform and a bar made to drop across the entrance against the back of the gate furnishing steadiness and preventing rattling. Grab handles, the upper sockets of which also serve as steps for mounting the car roof are placed at diagonal corners. The single sliding



P-A-Y-E EQUIPMENT FOR THE RICHMOND & HENRICO RAILWAY. A high folding gate closes the left side of the front platform. The platform steps are stationary



P-A-Y-E EQUIPMENT FOR THE RICHMOND & HENRICO RAILWAY. The upper sashes are stationary and the lower raise their full height. The net window guards are made in three sections and can be readily moved to the other side of the car

doors which are placed at the brake or right hand side of each platform are operated by foot pedals.

The windows have two sashes, the upper one stationary and the lower one made to raise its own height. With the exception of this stationary sash and the absence of ceiling pockets of the length of the lower sash, the window system is similar to that in the Brill semi-convertible type. The low window sills caused by this increased window opening have suitable arm rests and the center posts have push buttons, placed well out of reach of children. The transverse seats are of the Brill "Winner" reversible pattern. Screens made in three sections are provided which are held in hangers and can be removed to either side as required.

The body framing has corner posts of ash, $3\frac{5}{8}$ in., and side posts of the same material, $3\frac{1}{4}$ in. thick. The bottom fram-

ing consists of 4-in. by $7\frac{3}{4}$ -in. yellow pine side sills, with a 17-in. by $\frac{3}{8}$ -in. steel sill plate; $5\frac{1}{4}$ -in. by $6\frac{7}{8}$ -in. white oak end sills and crossings of $4\frac{1}{2}$ -in. by $5\frac{1}{2}$ -in. timber, also white oak. For additional strength, a $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $\frac{7}{8}$ -in. angle is riveted to the lower edge of the sill plate, extending from end to end, the lower leg of this angle projecting outwardly to form a support for the side posts. To protect the car from scraping by wagon wheels, a 2-in. by $\frac{3}{8}$ -in. plate has been placed horizontally beneath the side sills, flush with the outside sheathing of the car.

The principal dimensions and weights of these new cars are as follows:

Length of body	32 ft. 0 in.	Seating capacity	48
Length over platforms	44 ft. 0 in.	Type of trucks	39-E
Length of platforms	6 ft. 0 in.	Wheel base	4 ft. 6 in.
Centers of side posts	2 ft. 6 in.	Diameter of wheels	33 in.
Width over sills	8 ft. $0\frac{1}{2}$ in.	Size of journals	$3\frac{3}{4}$ and 3 in.
Width over posts	8 ft. 3 in.	Motors	West. 310—2-75 h.p.
Extreme width	8 ft. 5 in.	Wt. of car body, less electrical equipment	19,000 lbs.
From track to sills	2 ft. $7\frac{1}{2}$ in.	Wt. of electrical equipment	1,200 lbs.
From sills to trolley boards	9 ft. $0\frac{3}{8}$ in.	Wt. of air brake equipment	1,440 lbs.
From floor to headlining	8 ft. $0\frac{3}{8}$ in.	Wt. of motors	6,800 lbs.
From track to step	$15\frac{3}{8}$ in.	Wt. of trucks	10,000 lbs.
From step to platform	14 in.	Total weight	38,440 lbs.
From platform to floor	$8\frac{3}{4}$ in.		



BRILL SEMI-CONVERTIBLE CARS FOR THE NAHANT & LYNN STREET RAILWAY

BRILL PLAIN ARCH ROOF

THE Nahant & Lynn Street Railway Company, of Massachusetts, has just received two 30-ft. 8-in. semi-convertible cars from The J. G. Brill Company for service over its interurban route between these cities. This company is now entering upon the seventh year of its operation, and in

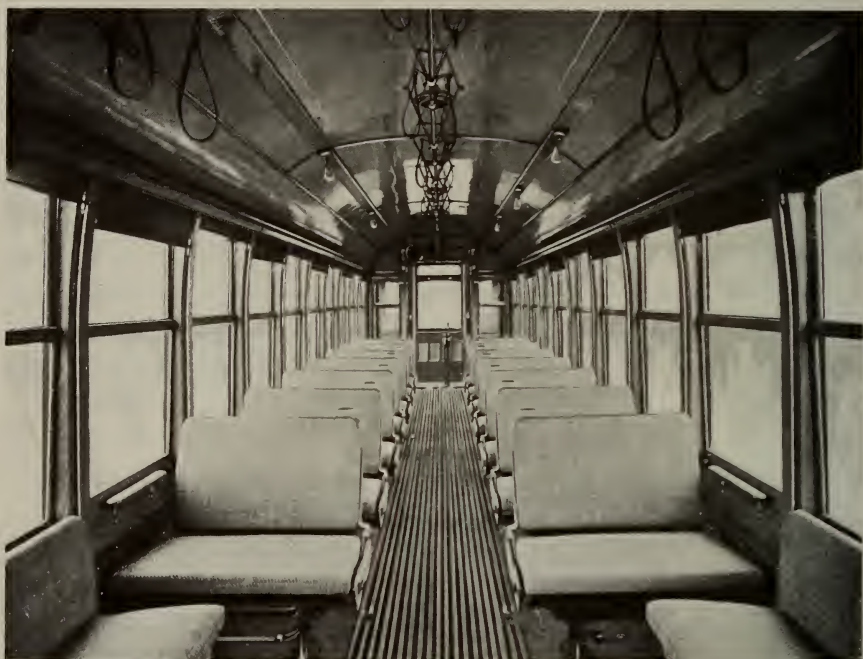
April, 1910, had an equipment of $6\frac{1}{4}$ miles of electric railway, 15 passenger cars, 1 service car and a snow plow. Its power is purchased from the Boston & Northern Street Railway Company.

These cars are mounted on Brill No. 27-GE1 trucks, and have the Brill Plain Arch Roof. This style of roof materially reduces the weight of the car and therefore comprises an interesting feature in construction. Eliminating the added weight of a monitor deck with its rafters and usual complement of ventilator sashes, a saving that is estimated at 25 per



BRILL SEMI-CONVERTIBLE CARS FOR THE NAHANT & LYNN RAILWAY COMPANY. The Brill Plain Arch Roof enables the canvas covering to be made in one piece without a seam.
The trucks are the Brill No. 27-G type

cent. of a monitor deck roof is effected. Six Globe ventilators are placed along the center of the roof. The one-piece covering, with the absence of joints which this type of roof makes possible, insures a watertight construction. The interiors are finished in cherry, with ceilings of birch veneer. With the wide aisles, large openings of the Brill semi-convertible window system, arched ceiling and cane upholstered Brill "Winner" seats, a most attractive interior effect has been effected. Longitudinal seats at the car corners each occupy the space of two windows. The hand straps over these seats are suspended from the roof sills instead of from poles.



BRILL SEMI-CONVERTIBLE CARS FOR THE NAHANT & LYNN RAILWAY COMPANY. The bright appearance of interior is the result of the extra high windows. Seating capacity, 44

The bottom framing consists of 4-in. by $7\frac{3}{4}$ -in. side sills plated with 15-in. by $\frac{3}{8}$ -in. steel, and transverse members of oak, $4\frac{1}{2}$ in. by $5\frac{1}{2}$ in. The end sills are also of oak, $5\frac{1}{4}$ in. by $6\frac{7}{8}$ in.; the corner posts are of ash, $3\frac{5}{8}$ in. thick, and the side posts, $3\frac{1}{4}$ in.

The principal dimensions and weights are as follows:

Length of body	30 ft. 8 in.	Seating capacity	44
Length over platforms	40 ft. 8 in.	Wheel base	4 ft. 6 in.
Length of each platform . . .	5 ft. 0 in.	Diameter of wheels	33 in.
Centers of side posts	2 ft. 8 in.	Size of journal	$3\frac{3}{4}$ in.
Width over posts	8 ft. 2 in.	Motors	West. 101-B—2-40 h. p.
Extreme width	8 ft. 4 in.	Wt. of car body less elec. equipment	17,420 lbs.
From track to sills	2 ft. $8\frac{1}{4}$ in.	Wt. of electrical equipment	1,140 lbs.
From sills to trolley boards . .	9 ft. $2\frac{1}{2}$ in.	Wt. of air brake equipment	1,500 lbs.
From floor to headlining . . .	7 ft. $9\frac{1}{8}$ in.	Wt. of trucks	11,500 lbs.
From track to step	$16\frac{1}{2}$ in.	Wt. of motors	5,460 lbs.
From step to platform	$14\frac{1}{2}$ in.	Total weight	37,120 lbs.
From platform to floor	$8\frac{1}{8}$ in.		

MORE INTERURBAN CARS FOR THE BRITISH COLUMBIA ELECTRIC RAIL- WAY COMPANY

BRILL No. 27-M.C.B.3 TRUCKS

THE three interurban cars in the accompanying illustration were photographed just before leaving the plant of the G. C. Kuhlman Car Company at Cleveland for Vancouver, B. C. They made the trip on their own wheels and arrived in perfect condition a few weeks ago. The cars are similar to those which were described in BRILL MAGAZINE of January, 1910, which article contained a description also of baggage cars and city cars delivered to the same system operating at Vancouver, New Westminster and vicinity. That article and an article in the May issue of 1908 contained descriptions of this unusually interesting city and interurban system.

As the photographs show, the cars are of the larger interurban type, with doors at the center of the vestibules for communication between cars. Operation in trains and the general features of the cars indicate that operating conditions are similar to those of steam roads. The cars have seven pairs of arch-top windows to each side, and a single window with arch top in addition at the toilet room in the corner. The windows raise for their full height and are arranged to be held at any point. The arch-top sashes and the ventilator sashes are glazed with cathedral glass set in lead. The windows in the vestibules drop into pockets. The right side of the vestibule at each end is arranged for a motorman's cab and has a single swing door with a drop sash. The opposite side of the vestibule has a two-leaf folding door hinged to fold against the body. A smoking compartment occupies the



MORE INTERURBAN CARS FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY COMPANY. The cars ready to leave the Kuhlman plant, Cleveland, for Vancouver, on their own wheels

space of two double windows at one end of the car and is separated from the general passenger compartment by a partition and sliding door with glass in the upper part. Brill "Winner" seats of the push-over back type, with high backs and head rolls, spring edge cushions, wooden arm rests, self-adjusting foot rests and corner grab handles are used in both compartments and furnish a seating capacity of 58. Full Empire headlinings, tinted and decorated, harmonize with the arch-top windows and ventilators and the rich African mahogany finish. Continuous parcel racks are provided in both compartments and the bronze trim throughout is of a generous and substantial character.

The bottom framing is built in an unusually strong manner and consists, in the main, of side sills built up of 30-in. by $5\frac{1}{16}$ -in. steel plates extending the full length of the car and reinforced with three angles of the following dimensions: 7 in. by $3\frac{1}{2}$ in. by $\frac{1}{2}$ in., 2 in. by $1\frac{3}{8}$ in. by $\frac{1}{4}$ in., and 2 in. by $1\frac{1}{2}$ in. by $\frac{1}{4}$ in., all riveted securely together and joined to 5-in. by 8-in. long-leaf yellow pine sills. The center sills are composed of 6-in. steel I-beams with yellow pine fillers and the intermediate sills are of $3\frac{3}{4}$ -in. by 6-in. yellow pine extending the full length of the car body in one piece. All the cross sills and parts for the underframing are of steel and white oak with $\frac{3}{4}$ -in. tie rods placed along each of the cross

sills, with a turnbuckle at the center. The needle-beams are made of 6-in. I-beams and the bolsters of 10-in. by 1-in. steel top and bottom plates. Under the outside main sills are placed $1\frac{3}{4}$ -in. truss rods anchored at the car body bolsters. The needle-beams are double trussed. The body framing is comprised of 4-in. by $6\frac{3}{4}$ -in. white ash corner posts and $1\frac{3}{4}$ -in. by $5\frac{1}{8}$ -in. double posts between each pair of windows, with intermediate posts $2\frac{1}{2}$ in. thick. The corner and side posts have $\frac{1}{2}$ -in. rods extending through side sills and top plates. The roof rafters are of ash, with six steel carlines to each roof. The trolley boards are continuous and extend the length of the body, and are provided with strong hooks to hold the trolley poles down when not in use.

The cars are mounted on Brill No. 27-M.C.B.3 trucks,



MORE INTERURBAN CARS FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY COMPANY. The smoking compartment occupies space of four windows and seats 16. The general passenger compartment seats 42

which were equipped with 33-in. diameter cast iron wheels for the journey of the train across the continent, but were replaced with 34-in. steel-tired wheels at their destination for service on the lines. These trucks have solid forged side frames with the extensions bent around the wheels, the standard practice of the builders, to give extra clearance and a larger surface for attaching the angle end frames. Gusset plates of large dimensions are folded over the side frames and together with inside and outside transom corner brackets



MORE INTERURBAN CARS FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY COMPANY. Brill No. 27-M. C. B. 3 truck on which the cars are mounted. Solid forged side frames

secure the transoms rigidly against cornerwise strains, an advantage in cross connection which the solid forged side frame has over any other is on account of the wide vertical dimensions at the center. The inside hung-brakes are equipped with Brill patented "Half-Ball" brake hangers.

The principal dimensions and weights are as follows:

Length of body	42 ft. 9 $\frac{5}{8}$ in.	From floor to headlining . . .	8 ft. 8 $\frac{1}{2}$ in.
Length over platforms . . .	53 ft. 10 $\frac{3}{8}$ in.	From track to step	17 $\frac{3}{8}$ in.
Length of platforms	4 ft. 8 $\frac{1}{2}$ in.	Risers	10 $\frac{3}{4}$ in.
Length of smoking comp't .	11 ft. 2 in.	Seating capacity	58
Centers of side posts	2 ft. 10 $\frac{1}{8}$ in.	Type of trucks	Brill No. 27-M.C.B.3
Width over sills	8 ft. 3 in.	Wheel base	7 ft. 0 in.
Width over posts	8 ft. 3 in.	Diameter of wheels	34 ins.
Extreme width	8 ft. 4 $\frac{3}{4}$ in.	Weight of trucks	10,920 lbs.
Track to sills	40 $\frac{1}{8}$ in.	Weight of car body, trucks,	
From sills over trolley boards	9 ft. 7 $\frac{3}{4}$ in.	and air equipment	59,420 lbs.

ADDITIONAL P-A-Y-E EQUIPMENT
FOR THE NORFOLK & PORTSMOUTH
TRACTION COMPANY

BRILL SEMI-CONVERTIBLE SYSTEM

EIGHT 30-ft. 8-in. Pay-As-You-Enter cars, built by The J. G. Brill Company, have recently been added to the rolling stock of the Norfolk & Portsmouth Traction Company for operation over its lines in and between these two cities. This company has in its service a large number of cars of various designs built by Brill companies, among which are six 51-ft. Brill semi-convertible cars containing both smoking and baggage, in addition to the passenger compartment, and which were placed on the lines early in 1907, shortly before the Jamestown Exposition, and during the Exposition attracted considerable attention because of their handsome appearance and comfortable interiors. These cars were shown in BRILL MAGAZINE, March, 1907. During the progress of the Exposition this company was called upon to handle the major portion of the travel to and from the grounds, and made unusual provisions for conveying the crowds by increasing its rolling stock and laying additional tracks. At one point where but a single-track viaduct was the sole means of crossing the Norfolk & Western Railway, necessitating a delay when cars had to pass each other, a temporary permit was obtained from the city to connect its lines with those of the Norfolk & Ocean View Railway, by which means it was enabled to operate its cars at a $\frac{3}{4}$ -to $2\frac{1}{2}$ -minute headway. It is seldom that the street railway system of a city of under 100,000 population is suddenly confronted with the problem of transporting for a period of but nine months a transient population that at times exceeded a half-million.

The statistics of the Norfolk & Portsmouth Traction Company as reported in May, 1910, show that it controls, by ownership or lease, a system of 138.91 miles of electric railway tracks, ferries to Newport News with two steamboats, ferries to Old Point Comfort with two steamboats, the City Gas Company, the electric light systems of Norfolk, Portsmouth, Berkley and vicinity, and at Suffolk, Virginia, in addition to a hotel and a land company. In November, 1910, the total rolling stock of its owned and leased lines consisted of 320 cars.

A distinctive feature of the new cars is the Brill Plain Arch Roof, which is equipped with the Globe type of ventilator; this type of roof construction is rapidly becoming popular. The single sliding door provided for exit at the diagonal corners is set on roller bearings and is operated by a foot pedal, the movement being communicated by a long arm lever attached to the outside of the door. A two-leaf folding door encloses the other side of the platform and folds against the vestibule corner post. When closed, this door is prevented from buckling by a pipe stanchion on the outside and a drop-bar on the inside pivoted to the vestibule corner post and extending across the door to a catch on the body corner post. A pipe railing divides the platform into entrance and exit passages and provides a standing place for the conductor in the



ADDITIONAL P-A-Y-E EQUIPMENT FOR THE NORFOLK & PORTSMOUTH TRACTION COMPANY. These cars have standard P-A-Y-E and Brill semi-convertible features and dimensions. Brill No. 27-GE1 trucks



ADDITIONAL P-A-YE EQUIPMENT FOR THE NORFOLK & PORTSMOUTH TRACTION COMPANY. The window sashes all raise into pockets in roof in the well-known Brill semi-convertible method. The seating capacity of the cars is 44

usual method of the Pay-As-You-Enter system. The entrance and exit doors in the body-end slide into the same pocket in a central bulkhead. The interior is finished in cherry with composition headlining. Hand poles with straps are placed over the longitudinal corner seats only. Brill "Winner" seats furnish a seating capacity of 42. The principal members of the bottom frame consist of 18-in. by $\frac{3}{16}$ -in. steel plates which extend the full length of the body in one piece. The plates are reinforced at the top with a 3-in. by $\frac{1}{2}$ -in. plate on the inside and at the bottom with a $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $\frac{3}{8}$ -in. angle, the flange of the angle extending outward. Flush with this reinforcing angle, there extends along the bottom of the concave panel a 3-in. by $\frac{3}{16}$ -in. steel bar. The end sills are reinforced with 11-in. by $\frac{1}{4}$ -in. plates with angles of the same dimensions as those used in the side construction. The cross-

ings are composed of 5-in. and 4-in. channels. The body corner posts are $3\frac{5}{8}$ in. thick and the side posts $2\frac{1}{4}$ in.

The principal dimensions and weights of these new cars are as follows:

Length of body	30 ft. 8 in.	From platform to floor . . .	$81\frac{5}{8}$ in.
Length over platforms . . .	42 ft. 8 in.	Seating capacity	44
Length of platforms	6 ft. 0 in.	Trucks	27-GE1
Centers of side posts . . .	2 ft. 8 in.	Wheel base	4 ft. 6 in.
Width over sills	7 ft. $11\frac{1}{4}$ in.	Diameter of wheels	2 ft. 9 in.
Width over posts	8 ft. 2 in.	Size of journal	$3\frac{3}{4}$ in.
Extreme width	8 ft. $5\frac{3}{8}$ in.	Motors	4 GE-210—65 h.p.
Height from track to under side of sills	2 ft. $8\frac{1}{2}$ in.	Wt. of car, less elec. equip. .	16,500 lbs.
Height from under side of side sills	9 ft. $1\frac{3}{4}$ in.	Wt. of electrical equip. . .	1,980 lbs.
Height from floor to center of headlining	8 ft. $0\frac{1}{4}$ in.	Wt. of air brake equip. . .	1,200 lbs.
From track to step	$16\frac{5}{8}$ in.	Wt. of trucks	12,000 lbs.
From step to platform . . .	15 in.	Wt. of motors	13,720 lbs.
		Total weight	45,400 lbs.



TWENTY-TWO SEMI-CONVERTIBLE CARS FOR THE WILMINGTON & PHILADELPHIA TRACTION CO.

STEEL UNDERFRAMES

THE J. G. Brill Company recently delivered to the Wilmington & Philadelphia Traction Company, 22 cars of the Brill semi-convertible type for use over its lines in and about Wilmington and Chester, and connecting with the Philadelphia Rapid Transit System at the suburb of Darby, in West Philadelphia. Although the car bodies are uniform in every particular, 16 are mounted on Brill No. 39-E trucks and the remainder on Brill No. 27-G1 trucks, the former being intended for local service in Wilmington and Chester and the latter for operation over the company's Delaware

County division between Angora and Media. This company operates eight subsidiary public service corporations in and between the two cities named in its title, comprising five electric street railway corporations, two electric light and power companies and a telephone company.

The Wilmington system traverses the main thoroughfares of the city, upon four of whose streets double-tracks are laid. In this city, as in other old cities, the streets are narrow, and few are wide enough for double-track operation. In Chester, also, the same difficulty is met, and in this city operation is



TWENTY-TWO SEMI CONVERTIBLE CARS FOR THE WILMINGTON & PHILADELPHIA TRACTION COMPANY. Sixteen of the cars are mounted on Brill No. 39-E trucks as shown and six are on Brill No. 27-G1 trucks

entirely confined to single-track with passing places. Chester is at the center of the system and has the principal transfer point from which lines radiate to Wilmington, Marcus Hook, Darby, Media and Upland. The track gauge is 5 ft. 2¼ in. and "devil strip" 4 ft. wide; the same are standard in the city of Philadelphia.

Another condition which has confronted this company is the number of grades that characterize the topography of the territory traversed by its lines. The grades on their Wilmington system are severe, very little if any level track existing. On one of the Wilmington lines there is a 10 per cent. grade, and numerous 4 to 6 per cent. grades are encoun-

tered. The through line from Wilmington to Darby, paralleling the Delaware River, is practically a succession of grades, as is also the Delaware County division between Angora and Media, the Chester division alone having low gradients. In the city service, stops are made on the far side of all streets, but this is about to be changed to near side



TWENTY-TWO SEMI-CONVERTIBLE CARS FOR THE WILMINGTON & PHILADELPHIA TRACTION COMPANY. Note the extra wide aisle obtained by the elimination of window pockets in the side walls and by bringing the seat ends between the posts and against the side lining

stops of all cars on the system. The cars are operated from both ends, except on two lines in Wilmington which are equipped with loop terminals.

The various traffic problems are being solved in a manner entirely satisfactory to the public, and it is reported that the new cars are receiving favorable comment from all sides. The type was selected to provide the most comfortable car for both summer and winter service and to enable the manage-

ment to gradually eliminate open cars from the equipment and thereby reduce the number of accidents incident to the running board open type. The older types of closed cars in service have very short platforms, which defect has been remedied in the new cars and is producing good results at congested points. This car is in every respect standard Brill semi-convertible type with the usual features—large window openings, sashes that raise into window pockets, low window sills with arm rests, Brill “Winner” seats, wide aisles, etc. The bottom framing of the cars is of all-steel construction, made up as follows: Side sills, 18-in. by $\frac{3}{16}$ -in. plate reinforced at top with a 3-in. by $\frac{1}{2}$ -in. steel bar and at bottom with $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $\frac{3}{8}$ -in. angles; intermediate sills, 4-in. channels; end sills, 10-in channels; transverse members, 4- and 5-in. channels.

The principal dimensions of all the cars are as follows:

Length of body	26 ft. 0 in.	From track to sills	2 ft. $7\frac{5}{8}$ in.
Length over platforms	37 ft. 0 in.	From sills over trolley boards	9 ft. 0 in.
Length of platforms	5 ft. 6 in.	From floor to headlining	8 ft. $0\frac{7}{8}$ in.
Centers of side posts	2 ft. 8 in.	From track to step	$15\frac{3}{4}$ in.
Width over sills	8 ft. $11\frac{1}{4}$ in.	From step to platform	$14\frac{1}{2}$ in.
Width over posts	8 ft. 2 in.	From platform to floor	$9\frac{3}{8}$ in.
Extreme width	8 ft. $5\frac{1}{2}$ in.	Seating capacity	40

The following relates to the 16 cars mounted on Brill No. 39-E trucks:

Wheel base	4 ft. 6 in.	Wt. of electrical equip.	959 lbs.
Diameter of wheels	20 in. and 33 in.	Wt. of air brake equip.	1,500 lbs.
Size of journals	3 in. and $3\frac{3}{4}$ in.	Wt. of trucks	10,000 lbs.
Motors	GE-67—2-50 h.p.	Wt. of motors	6,000 lbs.
Wt. of car, less elec. equip.	14,000 lbs.	Total weight	32,459 lbs.

The following relates to the 6 cars mounted on Brill No. 27-G1 trucks:

Wheel base	4 ft. 6 in.	Wt. of electrical equip.	1,500 lbs.
Diameter of wheels	33 in.	Wt. of air brake equip.	1,500 lbs.
Size of journal	$3\frac{3}{4}$ in.	Wt. of trucks	11,680 lbs.
Motors	GE-88—4-40 h.p.	Wt. of motors	9,600 lbs.
Wt. of car, less elec. equip.	15,670 lbs.	Total weight	39,950 lbs.

SEMI-CONVERTIBLE CARS FOR THE HAVANA CENTRAL RAILROAD BRILL 27-GE1 TRUCKS

TEN 28 ft. Brill semi-convertible cars have recently been placed on the lines of the Havana Central Railroad for service on its Guanabacoa branch. This company up to June, 1910, had completed 73 miles of electric road and when additional roadway, at that time projected, is finished, will operate its cars over 120 miles of intra and interurban railway, connecting the cities of Havana, Guines, Regla and Guanabacoa. At the date of this information, its rolling stock consisted of 38 passenger and baggage cars, 10 electric locomotives, 5 steam locomotives and 300 freight cars. In addition to this system, the company also owns and operates the Cuban Electric Company.

When it is considered that the country traversed by this company's lines is situated within the tropics and therefore subject to the sudden atmospheric changes that mark weather conditions in such parts, the reasons that have probably led to the selection of a semi-convertible type of car become plain.



SEMI-CONVERTIBLE CARS FOR THE HAVANA CENTRAL RAILROAD. Ten of these car bodies were shipped whole. The trucks are the Brill No. 27-GE1 type



SEMI-CONVERTIBLE CARS FOR THE HAVANA CENTRAL RAILROAD. The interiors are plainly but richly finished in mahogany. Brill "Winner" seats are used and the seating capacity of a car is 40

Although the temperature is fairly high throughout the year, the violent storms and heavy rainfall that attend the long tropical rainy season render a type of car that can be securely closed on all sides as readily and quickly as required, particularly well suited. The semi-convertible type of car, with its large window openings, excellent ventilation and a window system that makes it so readily interchangeable between a closed and an open car, is well adapted to meet tropical or semi-tropical conditions. The easy operation of the window sashes and their freedom from sticking results from the simple sliding arrangement, consisting of two roller guides on the top of the upper sash riding on steel bars in the pocket, and also from the fact that whereas the lower sash is wedged tight when down, it immediately becomes loose when raised.

The packing and shipping of these cars to their destina-

tion differed from the usual methods employed by car builders. Although it is customary to deliver cars that are exported via ocean freight in sections, these cars were boxed complete and carried on ship's deck. Each car in its entirety consisted of but three packages, the car body including platforms and appurtenances and two trucks. Packed and ready for shipment, the packages measured and weighed as follows:

Each car body, boxed, 38 ft. by 8 ft. 8 in. by 11 ft.; weight, 23,000 pounds.

Each truck, boxed, 11 ft. 6 in. by 7 ft. 6 in. by 3 ft.; weight, 10,000 pounds.

In general construction and interior arrangement, these cars present no departures from the Brill standard semi-convertible car. Woven cane seats, both transverse and longitudinal, provide a seating capacity of 40, and overhead rails with hand straps extend the length of the car body. The curtains are of pantasote and the low window sills have arm rests. Birch veneer ceilings and mahogany finish give the interior a rich appearance. The cars are equipped with a number of Brill patented specialties, such as steps, folding gates, "Dedenda" gongs, "Retriever" signal bells, "Dumpit" sand boxes, angle iron bumpers, ratchet brake handles and radial draw bars. These cars are mounted on Brill No. 27-GE1 trucks having solid forged side frames.

The principal dimensions and weights are as follows:

Length of body	28 ft. 0 in.	From step to platform . . .	14½ in.
Length over platforms . . .	37 ft. 0 in.	From platform to floor . . .	8⅞ in.
Length of platforms	4 ft. 6 in.	Wheel base	4 ft. 6 in.
Centers of side posts	2 ft. 8 in.	Diameter of wheels	33 in.
Width over sills	7 ft. 10½ in.	Size of journal	3¾ in.
Width over posts	8 ft. 2 in.	Motors	GE-67—2-40 h.p.
Extreme width	8 ft. 4 in.	Wt. of car less elec. equip. .	14,000 lbs.
From truck to under side of		Wt. of electrical equipment .	940 lbs.
side sills	2 ft. 8¼ in.	Wt. of air brake equipment .	1,500 lbs.
From under side of side sills		Wt. of trucks	12,000 lbs.
over trolley boards	8 ft. 11⅞ in.	Wt. of motors	4,770 lbs.
From floor to center of head-		Wt. of fenders	300 lbs.
lining	8 ft. 0½ in.		
From track to step	16½ in.	Total weight	33,510 lbs.

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

American
Car Company
St. Louis, Mo.

G. C. Kuhlman
Car Company
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

Wason
Manufacturing Company
Springfield, Mass.

Danville
Car Company
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Belgium and Holland

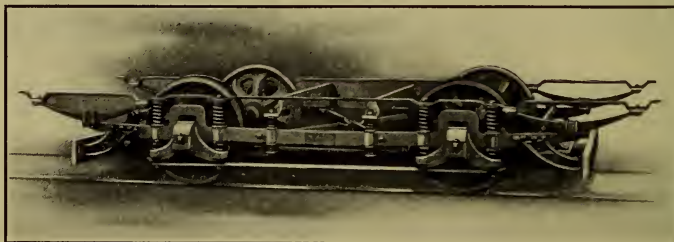
C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai

Italy

Giovanni Checchetti, Piazza Sicilia, 1, Milan



BRILL SINGLE-TRUCK No. 21-E

Sixteen years ago this truck was introduced just as it stands today and just as it will probably remain to the end of the chapter, for in all these years nothing has been found to improve it in any particular. It is the easiest riding single-truck in use today. The rhythmic motion of the coils is counteracted by the slower action of the half-elliptics placed on the extensions, which afford a long and steady spring base. The eight coil springs resting in pairs on the side frames close to the yokes and nearly over the heavy coil springs in the journal box ears, which support the side frames, relieve the part of the side frames between the yokes of the weight of the car body and leave it free to support the motors alone. The side motion of the car body is cushioned by an allowance of sufficient space in the side frames for play of the spring posts and by the torsional action of the semi-elliptics. Large diameter coil springs set low in the ears at either side of the journal boxes enable the car-body to be carried two inches lower than on any other single truck. The long life of the truck is due mainly to the solid forged side frames.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

Vol. V

SEPTEMBER, 1911

No. 9

BRILL MAGAZINE



St. James Street
Montreal, Canada



BRILL LONG-BROOM SWEEPER

This powerful snow fighting machine has proved its worth in many of the most northern cities during a number of recent years. An excellent feature of its operation is the arrangement for using the forward broom only if desired. This enables all of the power from the broom motor in the center of the cab to be applied to one broom, and one operator can devote his whole attention to this broom. The details of the sweeper are clearly shown and the names of parts given in the supplement accompanying this issue of BRILL MAGAZINE. Write for catalog showing long- and short-broom sweepers and single- and double-truck snow plows for every class of service.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL
MAGA-
ZINE



Wm. Ross

BUILDER, ORGANIZER AND MANAGER OF RAILROADS IN CANADA AND ELSEWHERE

BRILL MAGAZINE

Vol. V

SEPTEMBER, 1911

No. 9

JAMES ROSS

[WITH PORTRAIT INSERT]

JAMES ROSS, builder, organizer and manager of railroads, was born in Cromarty, Ross-shire, Scotland, 1848. He was educated at Inverness Academy, Scotland, and in England. He came to America in 1868, and two years after was resident manager of the Ulster & Delaware Railway, and later its chief engineer. During 1873 he was resident engineer of the Wisconsin Central Railway, and later with the Lake Ontario Shore Railway, then chief engineer and afterward general manager of the Victoria Railway. In 1878-9 he built the Credit Valley Railway, and became its general manager and was consulting engineer of the Ontario & Quebec Railway. In 1883 he took control of the construction of the Canadian Pacific Railway west of Winnipeg, and in 1885 completed the line over the Rocky Mountains, Selkirk and Gold Ranges. Next he conducted the settlement of the location of the line east of Montreal, legislation in Maine, etc., and then obtained the contract for building the remaining portion of the system. In 1888, Mr. Ross built the Regina & Lond Lake Railways, 250 miles long, and the next year the Calgary & Edmonton Railway, 300 miles. In 1892, with Sir William Mackenzie, he purchased the Toronto Railway, and converted it into an electric system. Through his instrumentality the Montreal Street Railway was reorganized in 1892 and changed from horse to electric traction, as were also the railways of Winnipeg, and St. John, N. B. In 1896, with Sir William Mackenzie, he acquired the tramways systems of Birmingham, England, and formed the City of Birmingham Tramways Company, and the next year secured rights to build electric tramways on the Island of Jamaica. He has been vice-president and managing director of the Montreal Street Railway, vice-president of the Toronto Railway, president of the Winnipeg Street Railway, St. John Railway, Dominion Bridge Company, Dominion Coal Company, and Mexican Light & Power Company. He is a director of the Bank of Montreal, the Canadian General Electric Company, and a number of other large corporations.

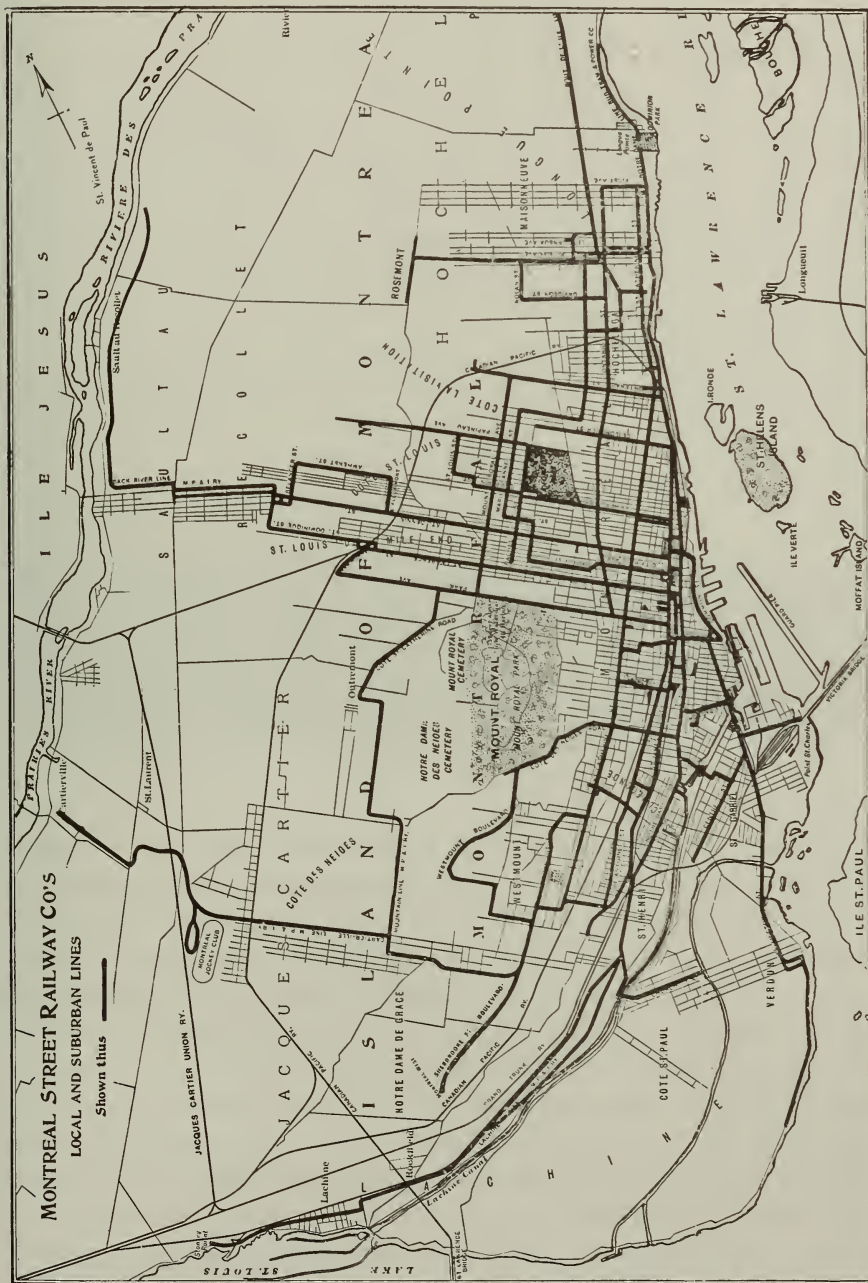
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

MONTREAL*

MONTREAL, metropolis and chief commercial city of Canada, is situated on the St. Lawrence River, at the head of ocean navigation, about 400 miles from where the river widens into the Gulf of St. Lawrence. Ten miles of substantial stone quays and warehouses extend along the city's river front, and behind these are the lines of the Canadian Pacific and Grand Trunk railroads. The ground slopes gradually upward for a mile and a half, to where Mount Royal rises abruptly to a height of 750 feet above the river and forms, with its park-covered summit, a picturesque background. This eminence confines the business and manufacturing districts to the side of the river and makes the transportation system exceedingly important to the development of the city. The accompanying map shows the extension of residential portions around the sides of Mount Royal. Each of the sections is spreading rapidly, and not many years hence will surround the acclivity. Already the population numbers about 600,000 and is growing fast, especially in the outlying districts served by the longer divisions of the city railway system. With the exception of Mount Royal, near the center, the land of the entire Island of Montreal is available for the city's expansion, and, being fairly level, presents no obstacles to the construction and operation of car lines.

Every part of the business section of the city is a scene of remarkable activity, for crowded into a comparatively small area are many great office buildings, banking institutions, shops with specialized and general merchandise, department stores, railway office buildings, two great railway stations and

* The thirty-third article of this series.



a large number of factories, although most of the latter, nearly a thousand in all, are along the wharfs and railroads. The splendid facilities for shipping to all parts of the Dominion and abroad will always give Montreal the ascendancy in manufacturing and distributing and also in the large financial undertakings, and with immensely resourceful, rapidly developing and limitless territory to supply, insures for the future a place among the largest and most important cities of the world.

Montreal has been as progressive in traction matters as in other enterprises and was one of the earliest cities to have



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Montreal, looking east from Mount Royal

horse-car lines and to change the motive power to electricity. Nothing is more indicative of the leading place the city has held for many years in street railroading than the fact that it is the birthplace of the Pay-As-You-Enter car. A step so radical as the introduction of the original prepayment method of fare collection is proof of a remarkably complete knowledge of the causes of traffic congestion and a broad experience with the most advanced methods known up to that time of alleviating an acute situation where elevated and subway lines were impracticable. Again referring to the map it will be seen that the lines converge in a few streets, and that many of the lines are long. The lines were originally extended to suburban towns, and giving rapid transit to the sections between, it was not long after the extensions were open that the population

grew thickly along these lines, making it necessary to institute a frequent schedule. In consequence the lines and streets in the business section were soon congested with cars and vehicles and the ability of the railway system to handle the rush hour traffic eventually reached its physical limitations. In addition to the crowded condition of the cars, the situation in Montreal is made extremely difficult by the heavy snowfall and low temperature of the long winters. Another difficulty is that of grades. For instance, Amherst Street rises 50 feet in a distance of 800 feet; St. Denis Street rises 47 feet in a distance of 700 feet; St. Lawrence Street rises 68 feet in a



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Continuation of the view shown on opposite page

distance of 1500 feet; Beaver Hall Hill, 60 feet in a distance of 900 feet; and Windsor Street, 70 feet in a distance of 1500 feet; while on Guy Street and Cote des Neiges Hill there is a rise of 350 feet in a distance of 5150 feet, with a maximum grade of 11% for about 100 feet.

The Montreal Street Railway Company, which operates all of the lines in the city and suburbs, published its 50th annual report last year. The interesting data which follows has been taken from this pamphlet.

"In 1892 the track mileage was $12\frac{1}{2}$ miles; at the present time the total single track mileage is $144\frac{1}{4}$ miles, exclusive of subsidiary companies. The rails used in 1892 were of 30-foot length, weighing 56 pounds to the yard, as against rails of 60-foot length, weighing 96 pounds to the yard, in use now.

"When, in 1892, the street railway company started its electric operation the entire service was run from a single power station on Cote Street. At present the power capable of development by the company for its cars is 11,400 k.w. generated by steam, and 9613 k.w. purchased water power, a total capacity of 21,013 k.w. as compared with 1200 k.w. in the original installation.

"In no department has the progress of the street railway company been shown more effectively than in their rolling stock. Of course, it would be useless to contrast the present cars with those of the horse regime; they are so far



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Intersection of St. Catherine and St. Lawrence Streets. Both streets are among the longest in the city and carry a heavy railway traffic for many miles each way from this point



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Craig Street, looking north from Bleury. One of the busiest points on the traction system

apart that comparison does not exist. In 1892 the road was equipped with cars which, luxurious as they seemed when contrasted with the old horse outfits, were only 20 feet in length. Outside of the application of motive power, their main equipment was the conductor and motorman, with lever and cumbrous hand-brake. The electric appliances were crude. The cars were fast enough, but they were not particularly reliable and not any too safe.

"The most modern cars now being turned out are 51 feet long, or three-quarters of the length of the best railway cars. They are built of steel almost entirely, on double trucks, just like steam railroad cars. They are vestibuled



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. St. James Street, from the corner of McGill. This is in the heart of the business district

at either end, thus adding greatly to the comfort of the crew. They are brilliantly lighted, equipped with electric push buttons to signal when a stop is required, furnished with electric heaters which preserve a comfortable temperature in winter, despite the everlasting opening and closing of doors, have easy cane seats, and run so smoothly that the returning worker in the evening can have the afternoon paper read before he reaches his dinner.

"In addition to this, the factor of safety has been enormously improved. The modern cars are equipped with circuit breakers which render delays from burnt-out fuses almost a negligible quantity, and all are furnished with air brakes, which reduce the work of the motorman almost to a minimum, minimizes the danger of collisions or trouble with street traffic. The adoption of the "Pay-As-You-Enter" principle has simplified the collection of fares, so that not only does the company secure a fare for every passenger, but much valuable time is saved at stopping points, as well as decreasing the number of accidents, in addition to additional comfort to the passenger.

"In 1892 there was an average of eight cars in the service. By 1904 this had grown to an average of 300, while at the present time the company has 600 cars running. Moreover, the passenger capacity of these cars has much more than doubled. The record for 18 years is worth considering.

"The rapid growth of the Montreal Street Railway is told perhaps more eloquently and briefly in figures than would be possible in any other way.

"The contrast between the modest original stock issue of \$125,000 and the present capitalization of \$10,000,000 is sufficiently striking. What makes it the more impressive, however, is the fact that by far the greater part of this capital has been added since the electrification of the road and its subsequent development.

"The Montreal Street Railway Company owns a majority of

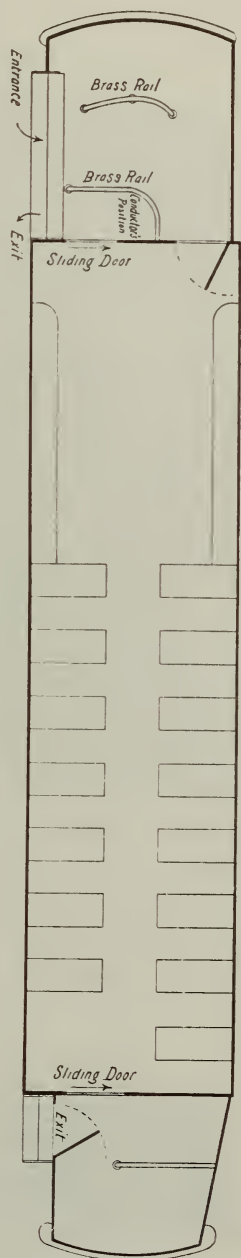


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The latest car of the Montreal Street Railway is practically the same as the one shown, except that it is constructed of steel up to the window sill and mounted on Brill No. 27-FE1 Trucks

the stock, and all of the bonds, of the Montreal Park and Island Railway Company, having a mileage of 49.64 miles, leases and operates the Suburban Tramway and Power Company (now called The Public Service Corporation), all of which company's stock and bonds it owns, of 6.12 miles, and also owns all the stock and bonds of the Montreal Terminal Railway Company, of 30.27 miles.

"In 1892 the number of passengers carried totaled 11,631,386, as compared with 60,281,834 in 1904, and 107,241,406 in 1910. The transfers used in 1892 were 5,994,113 as compared with 17,915,242 in 1904, and 36,437,123 in 1910.

"The service as given by the Montreal Street Railway Company is admitted to be the equal of any street car service on this continent. This is more remarkable when we take into consideration the hilly character of our city, the number of narrow streets and the topographical layout of the same, and the severe winter weather with its heavy snowfalls. The rates charged are less than in American cities. Since the introduction of the present electric car system, there has been a marked increase in many branches of manufacture, large workshops have been erected, where cars are built, electrical equipments renewed, work in connection with track made, etc., carried out, necessitating the employing of hundreds of men; the total wages paid out monthly amounting to about \$150,000.00."



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Floor plan of the car shown on opposite page

STEEL MOTOR CARS FOR ST. LOUIS & SAN FRANCISCO R. R. GAS-ELECTRIC SYSTEM

THE increasing demand for self-propelled cars as adjuncts to the regular equipment of steam roads was evidenced recently, when the Wason Manufacturing Company built for the General Electric Company six handsome gas-electric motor cars, which were delivered to the St. Louis & San Francisco Railway Company. Instead of a mechanical transmission between the combustion motor and the wheels, the prime mover in this car is an 8-cylinder, 550-r. p. m., 4-cycle gas engine of the "V" type, the energy from which is transmitted to the driving wheels by means of an electric drive, thus avoiding any direct mechanical gearing. The gas engine is direct coupled to an 8-pole, 600-volt commutating pole electric generator, forming a compact power plant. The electric transmission has the important advantage of permitting the engine to turn always in the same direction, the reversal of the car being accomplished by the movement of a handle which changes the direction of the rotation of the motors, without stopping the engine. The engine is cooled by thermo-siphon water circulation through radiators of the fin type located on the cab roof. The gasoline is pumped



STEEL MOTOR CARS FOR ST. LOUIS & SAN FRANCISCO R. R. Six of these 66-ft. steel car bodies were built by the Wason Manufacturing Company

from a 150-gallon tank suspended under the car. This tank is provided with strainers at its inlet and outlet, making it impossible for the carburetor to become obstructed by foreign matter. A hand pump is used for pumping gasoline when the engine is not in use. The car body, made entirely of steel, is 71 ft. 3 in. long over the buffers.

The underframe is of structural

steel, the outside sills being 7-in. channels, the center sills 7-in. I-beams, and floor beams of 5-in channels. The side posts and rafters are of 2-in. by 2-in. by $\frac{1}{4}$ -in. tees. The roof is of plain arch construction, and is covered with 16-gage galvanized iron, except under the radiators, where 22-oz. copper is used. The outside sheathing consists of steel plates approximately $\frac{1}{8}$ -in. thick. A very interesting feature concerning the construction of this car is the fact that it contains four separate compartments.

As the cars have center vestibules, the steel longitudinal stringers are of deep section and located and braced in such a manner that a low platform is allowed at each side, with space to allow a person to fold back the double door while



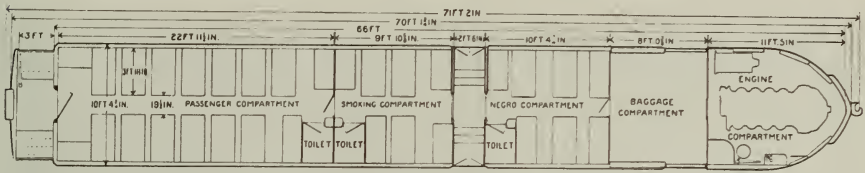
STEEL MOTOR CARS FOR ST. LOUIS & SAN FRANCISCO R. R. The rear platform has gates at the sides and center, and traps over the steps

standing on the platform. Under the side sills are placed trusses on deep queen posts, which posts are placed closer to the center of the car than is usual. These heavy under-trusses, together with the center sills of deep section, compensate for the cutting out at the sides of the car for the center vestibules. Reference to the diagram will show the



STEEL MOTOR CARS FOR ST. LOUIS & SAN FRANCISCO R. R. The passenger compartment is plainly but richly finished in mahogany

advantage of having an entrance at this point on either side, providing ingress and egress to the negro compartment and the smoking compartment, and making it unnecessary for the occupants from either compartment to go through the passenger compartment. It is interesting to note that the engine is centered over the forward truck, thus relieving the stringers almost entirely of directly supporting its weight.



STEEL MOTOR CARS FOR ST. LOUIS & SAN FRANCISCO R. R. The passenger compartment seats 34, the smoking and negro compartments each 14, a total of 62

Owing to the fact that "Jim Crow" car laws are in vogue in the section of the country where these cars are used, a separate compartment solely for negroes is necessarily provided. There are three toilet rooms, one each in the negro, smoking and main passenger compartments. These cars have a very attractive interior trim of highly finished mahogany, while the ceiling is of composite board. The cars are brilliantly lighted by incandescent lamps, the current being furnished by means of an electric generator. The seats are of the steam coach type, with spring backs and cushions. Those in the passenger compartment are covered with plush and those in the smoking room with leather. These cars have a seating capacity of 62 persons. Illustrations and description of a similar engine and engine room appeared in the October, 1910, issue of BRILL MAGAZINE, in an article on the General Electric Company's gas-electric cars for the Southern Railway Company, also built by the Wason Manufacturing Company.

The principal dimensions and weights are as follows:

Length of body	65 ft. 11 $\frac{3}{8}$ in.	From sills over roof	8 ft. 10 $\frac{3}{4}$ in.
Length over platforms	71 ft. 3 in.	From floor to headlining	8 ft. 0 in.
Length of rear platform	3 ft. 0 in.	From track to step	18 $\frac{1}{8}$ in.
Length of engine comp't	11 ft. 5 in.	Wheel base	7 ft. 0 in.
Length of baggage comp't	8 ft. 0 $\frac{3}{8}$ in.	Diameter of wheels	36 in.
Length of negro comp't	10 ft. 4 $\frac{3}{4}$ in.	Size of journals	4 $\frac{1}{4}$ x 8 in. and 5 x 9 in.
Length of passenger comp't	22 ft. 11 $\frac{1}{2}$ in.	Seating capacity	62
Length of smoking comp't	9 ft. 10 $\frac{3}{8}$ in.	Type of motors	G.E.-205, 600 volts
Centers of side posts	2 ft. 5 in.	Weight of car body less elec.	
Width over sills	10 ft. 0 $\frac{1}{4}$ in.	equipment	47,600 lbs.
Width over posts	10 ft. 4 $\frac{1}{4}$ in.	Weight of trucks	24,150 lbs.
Extreme width	10 ft. 4 $\frac{1}{4}$ in.	Total weight	71,750 lbs.
From track to sills	3 ft. 6 $\frac{3}{4}$ in.		

INTERESTING CARS FOR GREAT FALLS, MONT.

BRILL SEMI-CONVERTIBLE TYPE

THE Great Falls Street Railway Company recently added to its equipment, by receiving from the American Car Company eight cars of the Brill semi-convertible type, as shown in the accompanying photographs. This road, aside from operating within the city of Great Falls, traverses the suburban sections and connects with Black Eagle amusement park, which the company owns. The type of car illustrated is a very practical one to meet the severe climatic conditions, that vary from one extreme to the other in the northwestern part of Montana. These cars are arranged for double-end operation and have vestibuled platforms. The single entrance and exit openings, equipped with folding doors, are placed at diagonal corners. This feature, of course, not only adds greater warmth to the car during the winter season, but is also in conformity with the road's traffic conditions. The desired lightness of construction is strikingly shown in these cars, as they have plain arch roofs, which is the lightest type of roof



INTERESTING CARS FOR GREAT FALLS, MONT. The cars are for double-end operation, with entrance and exit at the rear end only



INTERESTING CARS FOR GREAT FALLS, MONT. The window openings are $4\frac{1}{2}$ inches higher than in those having the ordinary type of roof

constructed, and which also make a more roomy appearance within the car. The Brill No. 39-E trucks, with their solid forged side frames and single motors, on which the cars are mounted, are another feature that adds lightness to the cars. The interior trim is of highly finished cherry, with ceilings of birch veneer. The extra high straight windows, made possible by the plain arch roof, give the interior a very bright and pleasing appearance. The windows are equipped with double sash that slide into a pocket in the roof when both are raised, and the body entrances are equipped with double sliding doors. The cars are furnished with sixteen Brill "Winner" reversible and four longitudinal cane woven seats, which provide a seating capacity for 40 persons. A single row of eight lights

along either side of the ceiling and one on each platform supply adequate light. The bottom framing is of 4-in. by 7¾ in. yellow pine, outside sills plated with 12-in. by ⅜-in. steel plates; crossings of 3½-in. by 5⅞-in. oak, and end sills of 5¼-in. by 7¾-in. oak.

Length of body	25 ft. 9 in.	From track to step	16¾ in.
Length over platforms	38 ft. 9 in.	From step to platform	14 in.
Length of platforms	6 ft. 6 in.	From platform to floor	8⅞ in.
Centers of side posts	29 in.	Seating capacity	40
Width over sills	7 ft. 11½ in.	Type of trucks	Brill No. 39-E
Width over posts	8 ft. 2 in.	Wheel base	4 ft. 6 in.
Extreme width	8 ft. 5 in.	Diameter of wheels	33 in. and 21 in.
From track to sills	32¼ in.	Type of motors	GE-80—2-35-40 h.p.
From sills over trolley boards	9 ft. 0¼ in.	Total weight of car, trucks	
From floor to headlining	7 ft. 8¼ in.	and motors	35,000 lbs.



CONSTRUCTION CAR FOR THE LANCASTER & YORK FURNACE STREET RAILWAY COMPANY

DERRICKS AT EACH END

THE Lancaster & York Furnace Street Railway Company has over 12 miles of track, a rolling stock of over 14 cars, and connects the towns of York Furnace, Pequea and Rawlinsville, between which points considerable passenger and freight traffic is carried on. At its northern end the line connects with the Conestoga Traction Company's system, giving an entrance to Lancaster and the many towns in the vicinity. For a number of miles the road lies along the Conestoga Creek, which is remarkably picturesque and attracts pleasure riders from all the near-by cities, and at Pequea, on the Susquehanna, the scenery is also fine. The road also serves amusement parks at York Furnace and Pequea,

where it also connects with a branch of the Pennsylvania Railroad. Construction work is now under way for the extension of the road through one of the richest and most densely farming sections of Pennsylvania, where a large passenger and freight business will be secured. The J. G. Brill Company recently delivered to the road a very serviceable and substantial type of car for practically all kinds of construction work. The side sills are of yellow pine and end sills and crossings of oak, while the under trusses of 1¼-in. rod iron bear against queen posts. Each side of the car has stake



CONSTRUCTION CAR FOR THE LANCASTER & YORK FURNACE STREET RAILWAY COMPANY. The derricks at each end have the boom supported by the heavy plank shown, which also serves as a trolley board

pockets containing 12-in. stakes, and 10-in. side planks are also provided. The motorman's cab is placed in the center of the car, and is 7 ft. long by 4 ft. 6 in. wide. The controlling equipment is compactly arranged, so that there is ample room in the cab for tools and several men. The base of the cab is elevated 13¾ in. from the floor of the car and the corner posts are drawn in 12 in. at the sides to provide extra space for rails or other long materials. On the top of the motorman's cab, extending toward each end of the car, there is a 2¼-in. by 13¾-in. yellow pine plank, supported at each end by pine planks of the same dimensions, as shown in the accompanying photograph. The end supports are diagonally braced with steel angles which extend from the underframe and provide a support for a boom to be used as a derrick for loading and

unloading. The top plank also serves as a trolley board. The derrick that has been rigged on this car has a capacity of 2,000 pounds, and can readily be made applicable for hoisting heavier loads by attaching a couple of guy ropes to the top of the boom support and to the side of the car. This car is also equipped with Brill radial draw bar couplers and angle iron bumpers.

The principal dimensions are as follows:

Length of body	38 ft. 0 in.	Side sills to trolley boards . .	7 ft. 11¼ in.
Extreme width	8 ft. 0 in.	Type of trucks	Brill 27 G-1
From track to sills	3 ft. 6½ in.	Motors	West. 68-C



ATTRACTIVE INTERURBAN CARS FOR SCRANTON, PA.

BRILL SEMI-CONVERTIBLE TYPE

THE Scranton & Binghamton Traction Company, with its 20 miles of track, connects the towns of Clark's Summit, Dalton, Glenburn, Waverly, La Plume and Factoryville, and also reaches Lake Winola, a popular resort having a large summer colony, by a branch line from Factoryville. The J. G. Brill Company recently delivered to the road four combination passenger and smoking cars of the semi-con-



ATTRACTIVE INTERURBAN CARS FOR SCRANTON, PA. The car bodies are designed to be carried low to reduce the step heights, as stops are frequent on this interurban system

vertible type, shown in the accompanying photographs. The main members of the underframe are side sills of 4-in. by 7 $\frac{3}{4}$ -in. yellow pine plated with 15-in. by $\frac{3}{8}$ -in. plate steel; the end sills are of 5 $\frac{1}{4}$ -in. by 6 $\frac{7}{8}$ -in. oak, and the crossings are of 4 $\frac{1}{2}$ -in. by 5 $\frac{1}{2}$ -in. oak. At one end of the cars, separated by a hardwood partition having a double swinging door, is a



ATTRACTIVE INTERURBAN CARS FOR SCRANTON, PA. The general compartment seats 36 passengers and the smoking compartment, 12

smoking compartment furnished with six Brill reversible rattan seats accommodating 12 passengers. The passenger compartment is equipped with Brill reversible spring cushioned, plush covered seats. The interiors are attractively finished with mahoganzed cherry, with the ceilings tinted nile green. The cars are lighted with 22 lights, 15 in the passenger compartment, 5 in the smoking compartment and 1 for each platform. Signal push buttons are on each post

next the transverse seats and a parcel rack is placed over every alternate seat. There are 12 windows on each side of the cars, arranged with double sash of the Brill standard semi-convertible type. The lower sash automatically engages the upper one, and both slide into a pocket into the roof when raised. The body ends have 46-in. door openings and are equipped with mutually-operating double sliding doors. The roofs of the cars are of the steam car type, reinforced with concealed $\frac{5}{8}$ -in. steel rafters. The J. G. Brill Company has furnished the Scranton & Binghamton Railroad Company with similar cars in 1908, a description of which, with details and illustrations of this interesting interurban system, was published in the June, 1908, issue of BRILL MAGAZINE.

Following are the dimensions and weights of the new cars:

Length of body	34 ft. 4 in.	Type of trucks	Brill No. 27-E1
Length over platforms . . .	43 ft. 9 in.	Wheel base	6 ft. 0 in.
Length of platforms	4 ft. 8½ in.	Diameter of wheels	0 ft. 33 in.
Length of smoking comp't .	9 ft. 2 in.	Size of journal	3¾ in.
Length of passenger comp't .	25 ft. 2 in.	Type of motors	West. 101-D—4-45 h.p.
Centers of side posts	2 ft. 8 in.	Wt. of car body less elec.	
Width over sills	8 ft. 4 in.	equipment	19,500 lbs.
Width over posts	8 ft. 4 in.	Wt. of electrical equipment	1,500 lbs.
From track to sills	2 ft. 10¾ in.	Wt. of air brake equipment	1,500 lbs.
From track to step	19 in.	Wt. of trucks	19,000 lbs.
From step to platform . . .	14½ in.	Wt. of motors	10,920 lbs.
From platform to car floor .	8½ in.	Total weight	52,420 lbs.
Seating capacity	48		



CENTER-AISLE OPEN CARS FOR STROUDSBURG, PA.

BRILL PLAIN ARCH ROOF

THREE interesting cars of the type shown in the accompanying photographs were recently delivered to the Stroudsburg, Water Gap & Portland Street Railway Company. This road connects Stroudsburg with the famous

Delaware Water Gap, a distance of ten miles, and is now being extended over six miles to Portland. The car shown here is an admirable type for summer service, combining the advantages of a center-aisle car with those of the open type, eliminating the disadvantages of the latter, particularly in regard to the entrances. The 30-in. wire screens, raised 6 in. above the floor, and placed at each side of the car, form adequate guards, which extend only to the top of the seat backs, so as not to obstruct the view of seated passengers. The cars, while comparatively light, are very substantially built, and



CENTER-AISLE OPEN CARS FOR STROUDSBURG, PA. These cars seat 48 passengers and are mounted on Brill No. 27-G1 trucks

have side sills of $4\frac{3}{4}$ -in. by 7-in. yellow pine, plated with 12-in. by $\frac{5}{8}$ -in. steel, and end sills of $4\frac{3}{4}$ -in. by 9-in. oak and crossings of $4\frac{3}{4}$ -in. by $5\frac{1}{2}$ -in. oak.

The cars are equipped with 20 Brill "Winner" type reversible seats, made from the best quality of ash, furnishing a seating capacity for 48 persons. The bronze grab handles at the corners of the seat backs are of a design which does not require cutting off the corner of the frame. The interior of the cars is finished in ash, with the ceilings in car line finish. Striped duck curtains at each window and at the door openings are firmly held at the edges, to prevent them from being blown in or allowing rain to get into the car, by having 1-in. moulding run along the edges of the $\frac{1}{2}$ -in. grooves in which



CENTER-AISLE OPEN CARS FOR STROUDSBURG, PA. The seats are of the Brill "Winner" type, made of ash

the curtains slide. The cars are lighted by eight lamps in a single row down the center, and a light on each platform. The ends of the body have single sliding doors, and the vestibules are of the round end without doors. The cars have plain arch roofs and full-length trolley boards.

The principal dimensions and weights are as follows:

Length of body	29 ft. 2 in.	Type of trucks	27-G1
Length over platforms	38 ft. 7 in.	Wheel base	4 ft. 6 in.
Length of platforms	4 ft. 8½ in.	Diameter of wheels	34 in.
Centers of side posts	2 ft. 5 in.	Size of journals	3¾ in.
Width over sills	8 ft. 2 in.	Motors	G.E. 81—2-30 h.p
Width over posts	8 ft. 2 in.	Wt. of car, less elec. equip.	16,425 lbs.
From track to sills	2 ft. 8½ in.	Wt. of electrical equipment	1,150 lbs.
From track to step	16⅞ in.	Wt. of air brake equipment	1,500 lbs.
From step to platform	14½ in.	Wt. of trucks	14,000 lbs.
From platform to car floor	8 in.	Wt. of motors	8,000 lbs.
Seating capacity	48	Total weight	41,075 lbs.

INTERURBAN CARS FOR BOISE & INTERURBAN RAILWAY

BAGGAGE AND COMBINATION TYPES

THE American Car Company recently delivered to the Boise & Interurban Railway Company, Boise, Idaho, two very practical cars of the baggage and combination types, as shown in the accompanying photographs. This road, with its 36 miles of track, traverses a populous rural section, northwest of Boise, connecting the towns of Eagle Star, Middleton, Caldwell and Boise. The passenger compartment of the combination car illustrated has an attractive interior finish of cherry and is equipped with 12 Brill "Winner" reversible rattan covered seats and two longitudinal seats on either side at one end. This compartment is well lighted by a single row of five lights on either side and two center lights. The baggage compartment is separated from the passenger compartment by a hardwood partition, having a center sliding door. Folding seats along each side are provided, and on each side near the end there is a 5-ft. sliding door at the baggage entrances, the upper section of which is glazed with wire glass. The roof is of the steam coach style and extends over the vestibuled platforms. The underframing of this car has yellow pine outside sills 4 in. by $7\frac{3}{4}$ in., plated with 12-in by $\frac{3}{8}$ -in. steel plate; crossings of $4\frac{1}{2}$ -in. by $5\frac{1}{2}$ -in. oak and end sills of $5\frac{1}{4}$ -in. by $6\frac{7}{8}$ -in. oak. The baggage car is of plain arched roof construction, and is sheathed inside up to the roof with matched yellow pine. The floor is of $1\frac{1}{2}$ -in. hard maple. As shown in the illustration, this car can be successfully used for carrying passengers, as longitudinal wooden slat folding seats are provided at either side of the doors. The four windows on each side of the car, together with the three windows at each end and door lights, furnish adequate light.



INTERURBAN CARS FOR BOISE & INTERURBAN RAILWAY. A typical light-weight combination passenger and baggage car for moderately fast service. Mounted on Brill No. 27-El Trucks

An iron pipe guard rail separates the motorman's compartments, access to which is made by swing-in doors, at diagonal corners. The 4-ft. door openings have sliding doors that slide into a pocket between the walls of the car. A single row of



INTERURBAN CARS FOR BOISE & INTERURBAN RAILWAY. The passenger compartment is furnished with Brill "Winner" seats and the baggage compartment with folding slat seats for smokers



INTERURBAN CARS FOR BOISE & INTERURBAN RAILWAY. The car is equipped with couplers and air brake connections for handling freight cars. Mounted on Brill No. 27-G1 trucks

eight lights along the center of the car provide ample light. The underframing of the car has yellow pine outside sills $5\frac{7}{8}$ in. by $7\frac{7}{8}$ in., plated with 7-in. by $\frac{1}{2}$ -in. steel plate;



INTERURBAN CARS FOR BOISE & INTERURBAN RAILWAY. When hauling trail passenger cars this car is used as a smoker

center crossings of 4½-in. by 5½-in. oak, and end sills of 6¼-in. by 8½-in. oak. The outside sills are braced by under-truss rods of 1½-in. diameter steel, supported on queen posts, and securely anchored at the ends of the bolsters.

The principal dimensions of the combination type are as follows:

Length of body	31 ft. 8 in.	From sills to trolley board .	9 ft. 6¾ in.
Length over platforms . . .	41 ft. 8 in.	From floor to headlining . .	8 ft. 5⅝ in.
Length of platforms	5 ft. 0 in.	From track to step	18 in.
Length of passenger comp. .	22 ft. 6 in.	From step to platform . . .	14½ in.
Length of baggage comp. . .	9 ft. 2 in.	From platform to floor . . .	9⅞ in.
Centers of side posts	32 in.	Seating capacity	38
Width over sills	8 ft. 6 in.	Type of trucks	Brill No. 27-E1
Width over posts	8 ft. 6 in.	Wheel base	6 ft. 0 in.
Extreme width	8 ft. 6½ in.	Diameter of wheels	33 in.
From track to sills	35⅞ in.		

The principal dimensions of the baggage cars are as follows:

Length of body	41 ft. 0 in.	From sills to trolley board .	8 ft. 7⅞ in.
Centers of side posts	29⅞ in.	From floor to headlining . .	7 ft. 5⅞ in.
Width over sills	8 ft. 6 in.	Type of trucks	Brill No. 27-G1
Width over posts	8 ft. 6 in.	Wheel base	4 ft. 6 in.
Extreme width	8 ft. 7⅝ in.	Diameter of wheels	33 in.
From track to sills	37¼ in.		



P-A-Y-E CARS FOR FRANKFORD, TACONY & HOLMESBURG STREET RAILWAY

BRILL No. 39-E TRUCKS

THE illustrations shown are of an interesting type of P-A-Y-E car that was recently furnished by The J. G. Brill Company to the Frankford, Tacony & Holmesburg Street Railway Company. This road, operating through, and connecting Philadelphia with, a populous suburban section, meets with heavy traffic conditions during all seasons of the year. The Brill semi-convertible window system is particularly

adapted to the changeable climatic conditions of this locality. The Brill No. 39-E trucks, on which the cars are mounted, are the lightest bolster trucks constructed, and, together with the single-motor feature, add very much to the lightness of the car. The body entrances and exits have single doors that slide into a bulkhead in the center of the car. The



P-A-Y-E CARS FOR FRANKFORD, TACONY & HOLMESBURG STREET RAILWAY. When the window sashes are all raised into the roof pockets the car has much the appearance of an open center-aisle type

steam coach style of roof extends over the vestibules and has five ventilators on each side. The interior trim is of highly-finished cherry. Twenty Brill "Winner" reversible seats and one longitudinal seat on each side at the ends provide a seating capacity for 46 persons. The underframing consists of 4-in. by $7\frac{3}{4}$ -in. yellow pine outside sills, plated with 12-in. by $\frac{3}{8}$ -in. steel plates; the crossings are of $4\frac{1}{2}$ -in. by $5\frac{1}{2}$ -in. oak, and end sills of $5\frac{1}{4}$ -in. by $6\frac{7}{8}$ -in. oak.



P-A-Y-E CARS FOR FRANKFORD, TACONY & HOLMESBURG STREET RAILWAY. The large Brill Semi-Convertible cars are for heavy service between Philadelphia and suburban towns to the north

Length of body	33 ft. 4 in.	Seating capacity	46
Length over platforms	45 ft. 4 in.	Type of trucks	Brill No 39-E
Length of platforms	6 ft. 0 in.	Wheel base	4 ft. 6 in.
Centers of side posts	2 ft. 8 in.	Diameter of wheels	21 in. and 34 in.
Width over sills	8 ft. 2 in.	Size of journals	3 in. and 3¼ in.
Width over posts	8 ft. 2 in.	Type of motors	G.E.-219—2-50 h.p.
Extreme width	8 ft. 5½ in.	Wt. of car body less elec. equip.	20,000 lbs.
From track to sills	2 ft. 8¾ in.	Wt. of electrical equipment	1,100 lbs.
From sills over trolley boards	9 ft. 3¾ in.	Wt. of air brake equipment	1,500 lbs.
From floor to headlining	8 ft. 4 in.	Weight of trucks	10,400 lbs.
From track to step	17 in.	Wt. of motors	5,800 lbs.
From step to platform	14½ in.	Total weight	38,800 lbs.
From platform to floor	8½ in.		



EXPRESS AND BAGGAGE CAR FOR
OAKLAND, CAL.

BRILL No. 27-M.C.B.3 TRUCKS

THE baggage and express service of the various suburban and interurban electric lines throughout the country has grown to such importance that the demand for baggage cars steadily increases. The car illustrated here was recently delivered to the Oakland & Antioch Railway Company, Oakland, Cal., by the American Car Company. Powerfully constructed for carrying heavy loads and for fast

service, the car is mounted on Brill No. 27-M.C.B.3 trucks, which are particularly adapted for this class of service cars. As is shown in the accompanying photographs, the car has a plain arch roof, which adds very materially to the lightness of construction. The two swinging entrance doors, placed in the center at each end of the car, also serve for loading long pieces of material. At each side in the center there are two 6-ft. sliding doors, the upper sections of which are glazed with wire glass. The three end and side door windows make the car well lighted, and a single row of ten lights along the center



EXPRESS AND BAGGAGE CAR FOR OAKLAND, CAL. The car is intended for locomotive service and is mounted on Brill No. 27-M.C.B. trucks, capable of a speed of 60 miles an hour

of the roof furnish ample light at night. The interior is sheathed up to the roof with matched yellow pine, and the floor is laid with $1\frac{3}{4}$ -in. hard maple. The underframing consists of yellow pine outside sills, $4\frac{1}{2}$ in. by $7\frac{3}{4}$ in., plated with $7\frac{3}{4}$ -in. by $\frac{5}{8}$ -in. steel plate and braced with under-truss rods of $1\frac{1}{2}$ -in. steel. The two center sills and all intermediate sills are of 6-in. I-beams, filled with yellow pine.

Length of body	45 ft. 0 in.	Type of trucks	Brill No. 27-M.C.B.3
Centers of side posts	31 in.	Wheel base	6 ft. 6 in.
Width over sills	9 ft. 6 in.	Diameter of wheels	33 in.
Width over posts	9 ft. 6 in.	Type of motors	G.E.-205—4-75 h.p.
Extreme width	9 ft. 8 in.	Wt. of car body	23,000 lbs.
From track to sills	$40\frac{1}{2}$ in.	Wt. of trucks	21,520 lbs.
From sills over trolley boards	8 ft. $9\frac{3}{4}$ in.	Wt. of motors	14,800 lbs.
From floor to headlining	7 ft. $5\frac{3}{4}$ in.	Total weight	59,320 lbs.

A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

VI

ALLUSION has been made in this sketch of history to the fact of the city of Benjamin Franklin having been the seat of the nucleus of electric propulsion and its adaptation to the moving of street railway cars; but it was the Brill works which occupied this proud position, and not the inhabitants of the city. In May, 1892, by which time the owners of the lines in Philadelphia, always intent upon furnishing the best for good service as well as for economies of operating, had come to the point of adopting electricity, the conservatives—the timidly conservatives—of the “City of Brotherly Love” took alarm at the danger and encroachment on private rights which they could foresee, held a town meeting at the Academy of Music to protest against this innovation. Their ancestors had decried the introduction of gas, had ridiculed “stones” (anthracite coal) for fuel, had shown how horse-car lines would ruin the city. They did not, however, stop the march of improvement, and since have, in the case of many of them, taken it out in vilifying the progressive railroad owners for making fortunes as a result of the good judgment and pre-vision which they used.

With promptness after this time, the several cable lines, which had cost millions of dollars, were taken out, the several companies of railways in Philadelphia were corralled under one ownership and all lines were changed to electric lines.

The benefits of this new method soon showed its far-reaching advantages—in the speed of travel, the facilities for operating more cars, the facility for heating the cars, and in cleanliness of the streets (for at least 20,000 horses were taken off the streets), and by the use of sprinklers driven by electric power the cost of sprinkling, which the city should pay for, was reduced to an extremely low point.

Those capitalists of Philadelphia who appreciated a good thing when they saw it, branched out from this city, promoted and capitalized electric railroads throughout the United States and many foreign countries, and they, too, reaped large profits.

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

American
Car Company
St. Louis, Mo.

G. C. Kuhlman
Car Company
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

Wason
Manufacturing Company
Springfield, Mass.

Danville
Car Company
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai

Italy

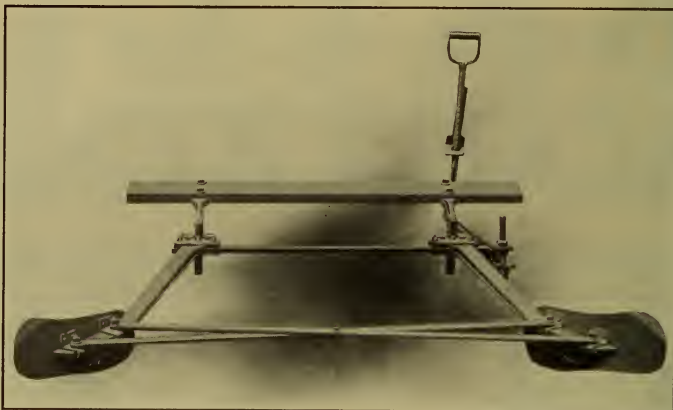
Giovanni Checchetti, Piazza Sicilia, 1, Milan

The Brill Exhibit at Atlantic City Convention of the American Electric Ry. Ass'n

will be the most interesting from many standpoints that has ever been made and will include a Brill semi-convertible car with up-to-date features throughout; a No. 39-E single-motor truck operated on a testing platform; one of the 600 trucks of the No. 27-GE1 type ordered last month by the Chicago Railways Company; a huge truck of the No. 27-M. C. B.3 type measuring 11 feet 8 inches long—one of 100 for the Cambridge subway service of the Boston Elevated Railway Company; a light interurban truck of the No. 27-M. C. B. type; a No. 21-E single-truck with an interesting improvement; a representative line of city and interurban car seats; fare boxes to suit every requirement; seating materials, springs, "Half-Ball" brake hangers and other specialties. Illustrations of the exhibit will appear in the next issue of BRILL MAGAZINE.

BRILL MAGAZINE





THE BRILL TRACK SCRAPER

This track scraper has elastic arms which allow the blades to spring over crossings and has diagonal cross bracing which gives firmness and strength exactly where it is needed and prevents bending or breaking. The removable shoes can be inexpensively replaced. Made from the best materials, the Brill scraper is built for the hardest kind of work. It is simply constructed and can be installed under platforms of any height without blocking or cutting of timbers. The blades can be drawn up to any desired height by the handle and dropped instantly on the track by kicking a trigger. The scraper will save bringing out your sweepers for light snows and will prove indispensable during heavy storms by keeping the tracks clear after the plows and sweepers have done the heavy work. It is only necessary to give the gage of track when ordering.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



M. A. House

PRESIDENT OF THE UNITED RAILWAYS & ELECTRIC COMPANY, OF BALTIMORE, MD.

BRILL MAGAZINE

Vol. V

OCTOBER, 1911

No. 10

WILLIAM ALEXANDER HOUSE

[WITH PORTRAIT INSERT]

WILLIAM ALEXANDER HOUSE, president of the United Railways & Electric Co., of Baltimore, Md., was born in Baltimore, March 26, 1860, and received his education at the public and private schools of that city. His street railway service began in 1880 as a clerk in the office of the People's Passenger Railway Co., and in 1884, when this road was reorganized, he was appointed secretary and general superintendent. In 1889, when the Baltimore Traction Co. purchased the People's Railway Co., he was elected general manager. The expansion was rapid and in two years, beginning with 1892, the North Baltimore, Gwyn Oak & Powhatan and Curtis Bay lines were absorbed, double-tracked and electrified, and in 1895 the shore line was built along the south side of the Patapsco River. In recognition of his services he was made vice-president as well as general manager and in 1896 became president of the company. The following year the Baltimore Traction Co., and City Suburban Co., combined under the name of the Baltimore Consolidated Railway Co., and Mr. House became its vice-president and general manager. In 1889, when all the street car lines of Baltimore were finally merged into the United Railways & Electric Co., it became his task as general manager to completely organize the system. In 1902 he became vice-president of the company. The central power station and many miles of track and overhead equipment were destroyed in the great Baltimore fire of 1904, but under his supervision service was resumed on most of the city lines within twenty-four hours. In 1907, shortly after the death of Gen. John M. Hood, he succeeded to the presidency.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

LIMA, PERU*

LIMA, the capital of Peru, is situated on a plain seven miles from its port, Callao. The city is divided into two unequal portions by the River Rimac, a shallow and rapid stream crossed by two bridges. The principal part is on the south side of the river and presents a fine appearance on every side because of the numerous domes and spires of its churches and government buildings and because of the system of wide boulevards with which it is surrounded. At the cen-



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Lima lies on a plain skirted by granite hills on the east, from which this view was obtained. The larger portion of the city is across the River Rimac, seen in the picture

* The thirty-fourth article of this series.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Union Street, the principal business thoroughfare of Lima. Being an old city and formerly walled, the streets are mostly narrow. The car is the same type as that shown on page 280

ter of the city is the Plaza de Armas, a splendid square having the appearance of a tropical garden, with arcades on two sides and the other sides occupied by the Cathedral, Archbishop's Palace, Government Palace, the Municipal Building, and several clubs. The official, social and business life of the metropolis focuses on this square and the adjacent streets, and day and evening, at all seasons, the scene is one of great animation. There are about thirty squares or plazas which relieve the city of the crowded appearance it would otherwise have, for, being an old city and formerly surrounded by a wall, the streets are mostly narrow. A wide avenue is being built across the center and will connect with the encircling boulevards. This avenue will be one of the prominent features of the city in the future and is greatly needed to alleviate the congestion of vehicular traffic of the streets running

in this direction. A favorite drive and promenade is the Paseo Colon, a fine boulevard with flower beds and statuary along the center and the statue of Columbus at the head. This leads to the Exposition Park, which, with the Zoological and Botanical Gardens, are national institutions and attract large numbers of visitors and students. The city is one of the foremost educational centers in Latin America and has a



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. About twenty-five miles of single-track lines of 4 ft. 8½ in. gage, traverse the city in all directions

university, schools of engineering, navigation, arts and trades, agriculture and other technical and collegiate institutions.

Lima is the commercial center of Peru as well as the capital and metropolis, and through its port, Callao, exports silver and copper ore, nitre, sugar, rubber, cotton, wool and other products. The future is very promising, as the country has immense tracts of fertile land and the mountains are rich in ore of various kinds, and, moreover, the government is stable and progressive. The opening of the Panama Canal will

be of incalculable benefit to the country and gives positive assurance of enormous increase in population, railway mileage and development of resources within the next few years. The port of Callao, seven miles from Lima and connected by steam and trolley lines, is situated on an extensive bay with safe anchorage for an unlimited number of vessels. The system of docks covers an area of 50,000 square meters



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Entrance to Descalsas Park, famous for its statuary. A number of fine parks, including zoological and botanical gardens, are in the suburbs and are reached by the electric lines

and cost \$10,000,000 to construct. The population of Lima is close to 150,000 and that of Callao about 35,000.

The electric railway system of Lima and vicinity is operated by the *Empresas Electricas Asociadas* and consists of about twenty-five miles of track in the city and about fifty miles outside of the city. The lines in Lima are mostly single-track on account of the narrow streets, and open single-truck cars seating forty passengers each are chiefly used. The fare on the lines which serve the city is equivalent



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Power for the electric cars and for city lighting is obtained from two hydro-electric plants, one of which is located at this point on the River Rimac. The Andes are seen in the distance

to $2\frac{1}{2}$ cents United States currency. The heaviest traffic is on the two lines to Callao, a large part of the population of Callao being transported to Lima daily, taxing the capacity



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. These cars, of the Stephenson Semi-Convertible type, are used on the longer divisions of the system. Length of body, 28 ft.; length over platforms, 36 ft.; width, 8 ft. 5 in.; Brill No. 27-G1 Trucks

of the cars severely during the early morning and late afternoon. Double-truck closed cars with first- and second-class compartments run on these lines on a six-minute schedule, the running time between the cities being twenty minutes. The larger cars are also operated on the lines to Miraflores, Barranco, Chorrillos and Bellavista, beautiful residential sub-



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The cars are divided equally into first- and second-class compartments. The lower sashes drop and the upper sashes raise, leaving the window openings entirely free of sashes when desired

urbs on the coast, distant about twenty to forty minutes by electric cars running every six minutes. Beyond these suburbs are several popular bathing resorts reached by the trolley lines, each being a source of considerable income to the company. The mild and delightful climate of Lima and of the suburbs on the coast makes pleasure riding an important part of the company's business. In summer the thermometer does not exceed 86° F. and in winter rarely falls below 54°, and

storms are unknown. In the immediate suburbs of Lima are a number of parks and a large cemetery, all of which are reached by the lines. The city has the second largest bull-ring in the world, which, with the pavilion of the jockey club and other resorts in the neighborhood, also increase the traffic. The cars obtain their power from two hydro-electric plants on the River Rimac, and the company also furnishes current for



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Eight-bench single-truck cars are chiefly used on the city lines. A new type of prepayment open car is now being built at the Brill Works

electric lighting and power. Three sub-stations are maintained for the distribution of current at the required voltage. The electric cars, railway equipment and power plants were furnished by American concerns through W. R. Grace & Co., the cars and trucks being mostly from The J. G. Brill Company and the John Stephenson Company. The former company is at present building a number of prepayment cars for the Lima lines similar to those sent to San Juan, Porto Rico, last spring, and described and illustrated in BRILL MAGAZINE, issue of May, 1911, the difference being that the Lima cars will be shorter and mounted on single-trucks. These cars will be shipped in December and will be described in the January issue.

THE BRILL EXHIBIT AT THE A. E. R. A. CONVENTION

THE Railway Appliance Exposition in connection with the American Electric Railway Association Convention held on the "Million-Dollar Pier," Atlantic City, the second week of October, was the largest and most successful in the history of the organization. Seventy-five thousand square feet of exhibit space was occupied by over 225 separate exhibitors. The exhibit of The J. G. Brill Company and allied companies occupied a prominent position in the Main Building, and comprised a No. 39-E single-motor truck on a testing platform; a No. 27-M. C. B. 3 truck, one of an order of eighty for the Boston Elevated Railway Company for Cambridge Subway service; a No. 27-GE1 truck, one of six hundred ordered by the Chicago Railways Company; a No. 27-M. C. B. 1 truck for light interurban service, and a No. 21-E single-truck; a representative line of city and interurban car seats; fare-boxes for prepayment cars, seating materials, springs; "Half-Ball" hangers and other patented specialties. On the Boardwalk, near the entrance to the Main Building, was shown a Brill Semi-Convertible Pay-As-You-Enter car having the Brill Plain Arch Roof with the new type of Brill Exhaust Ventilator which changes the air in the car in accordance with the Board-of-Health regulations of the principal cities of the United States. The advertising spaces on both sides of the car were filled with photographs of city and interurban cars for all classes of service, snow sweepers and plows, centrifugal sprinkling cars, etc. The car exhibited by the Gould Storage Battery Company, and which stood next to the Brill car, was one of thirty-five built by The J. G. Brill Company for the Third Avenue Railway (fifteen additional are being built). The gas-electric car exhibited by the General Electric Company was one of

six for the Frisco lines, of which the steel bodies were built by the Wason Manufacturing Company, and were described in the last issue of BRILL MAGAZINE.



BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. This car, exhibited on the Boardwalk, has Brill Semi-Convertible Windows, Brill Plain Arch Roof, Brill Exhaust Ventilators, Pay-As-You-Enter platforms, and is mounted on Brill No. 39-E Single-Motor Trucks. The car was sold on the opening day of the Convention to the Fitchburg & Leominster Railway Company



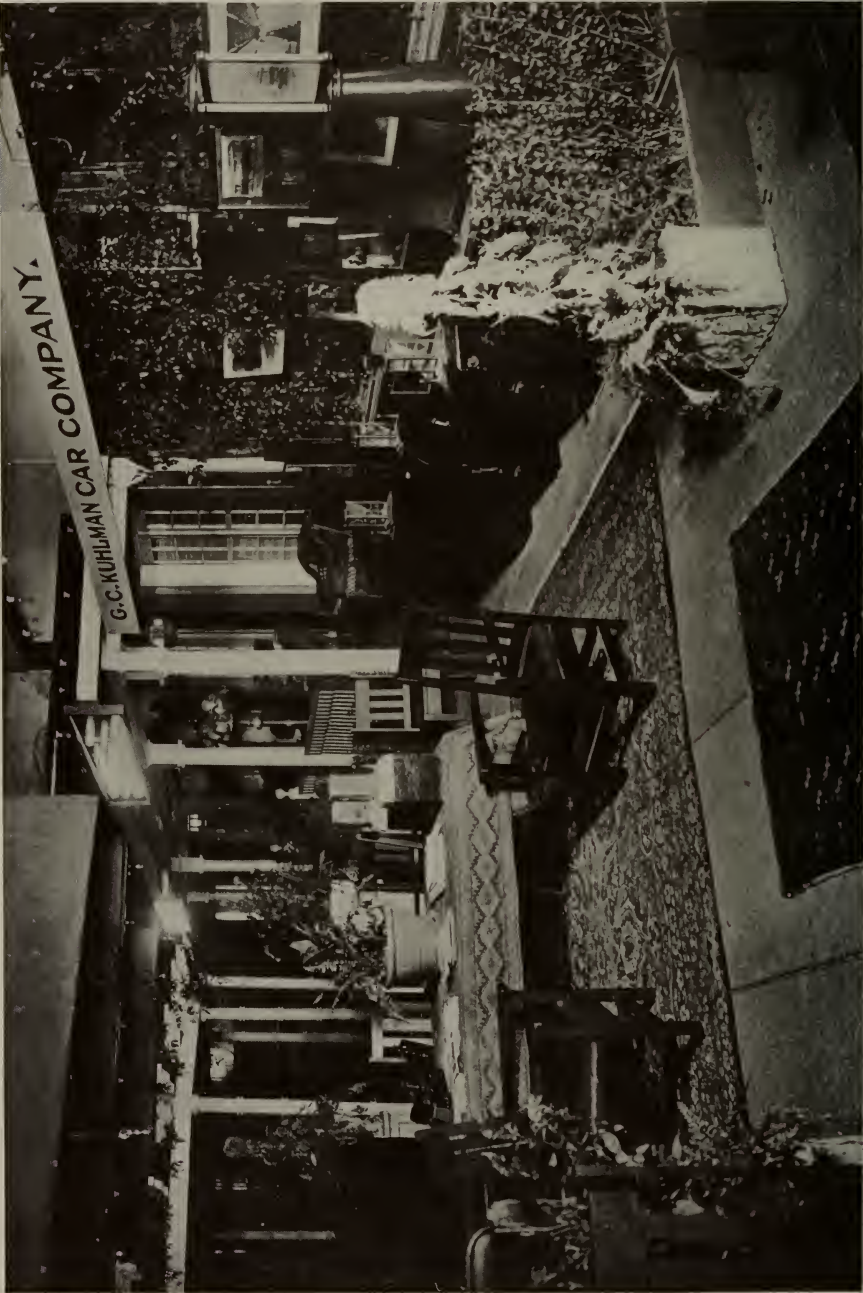
BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. The Boardwalk in front of the "Million-Dollar Pier," on the opening day. The main entrance to the Exposition is just beyond the right side of the picture. Several hundred rolling chairs were engaged for the free use of delegates and members. The car with "BRILL" in electric lights on the roof is the one shown on the opposite page



BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. This view is from a point just inside the main entrance. The officers of the American Electric Railway Association and the American Electric Railway Manufacturers' Association honored the Dearborn Drug & Chemical Company and The J. G. Brill Company by using their combined reception booths for their headquarters during the evenings for the reception, ball and entertainments



BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. This part of the reception booth was the gathering place for railway officials who attended the Convention from all parts of the United States, Canada, Mexico and abroad. The insignia of the American Electric Railway Association and its affiliated organizations is shown at the center of the photograph



BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. Looking from the entrance to the truck section of the Brill exhibit the scene was unique and attractive, and animated at all times with constantly changing groups of visitors. Turn to the picture on page 290 to realize the attractiveness of the surroundings



BRILL EXHIBIT AT THE A. E. R. A. CONVENTION. Five types of Brill Fare Boxes, six styles of city and interurban Car Seats, rolls of lined and unlined Woven Cane, Springs of every description, "Half-Ball" Brake Hangers, and other patented specialties were attractively shown. The swinging frames on the pedestal at the left displayed photographs of all modern types of cars, including those of all-steel construction



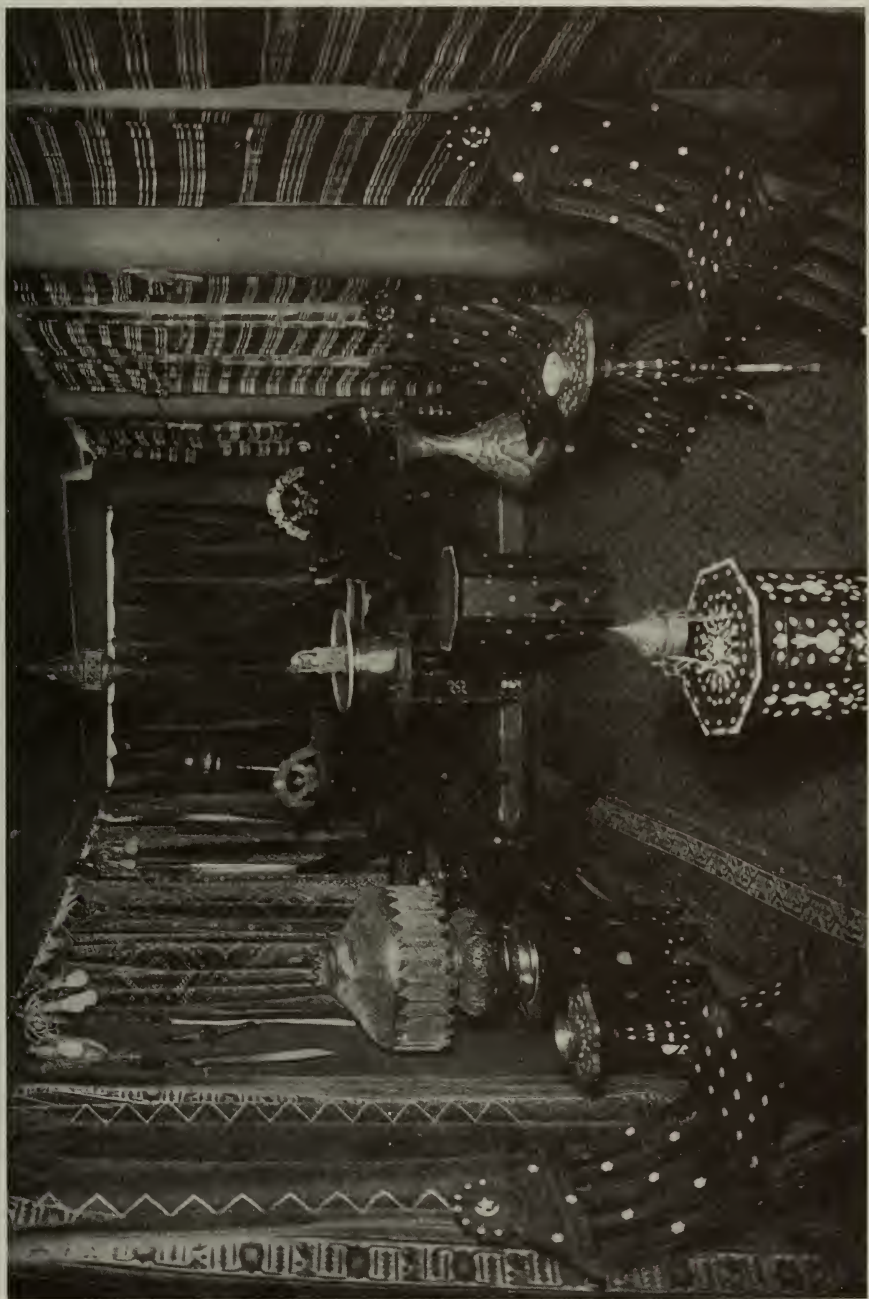
BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. The Truck in the foreground is a No. 39-E Single-Motor type on a testing platform mounted on rollers journaled in Standard Roller Bearings and driven by the new type of General Electric Company's 40-h.p. 500-volt Motor No. 203; the Air-brake, Compressor, etc., are also of G. E. type



BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. A No. 21-E Truck is shown at the bottom of the photograph, with a huge No. 27-M.C.B.3 type just beyond. The latter is one of 80 furnished to the Boston Elevated Railway Company for Cambridge Subway service. A lighter interurban truck of the No. 27-M.C.B.1 type is next in the line. A No. 27-G.E.1 Truck, of an order for 600 for the Chicago Railways Company, was also shown



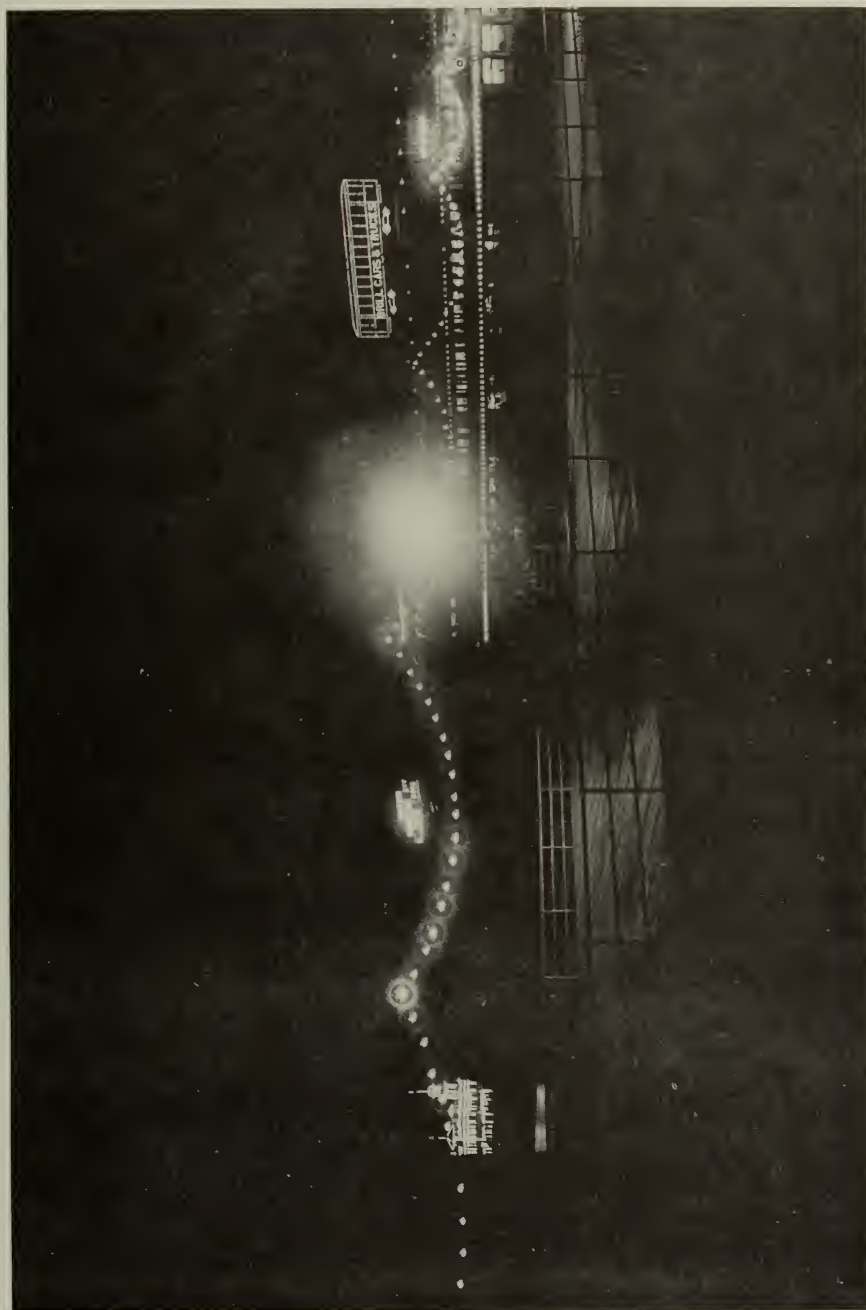
BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. A bit of lawn with an electric fountain in the center was brilliantly lighted by tubular electric lights within the alabastine columns of a vine-covered pergola. This greatly admired arrangement of the central space at the side of the main lobby was a combined display of the Dearborn Drug & Chemical Company and The J. G. Brill Company, and was designed by H. G. McConaughy, of the former company, Chairman of the Exhibit Committee of the Exposition



BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. The porch shown in the photograph on the opposite page led into a Turkish Room built on a specially constructed concrete extension at the side of the pier. A cloak room and kitchenette occupied one end, and a number of maids and waiters served tea and orangeade and checked the wraps and coats of our guests



BELL EXHIBIT AT THE A.E.R.A. CONVENTION. A sixty-five-foot electric sign on the roof of the Main Building outlined a Brill Plain Arch, Roof car in emerald lights. The truck wheels had the appearance of revolving and the letters were made of white lights. From dark till midnight during the Convention Week this sign of a thousand lights was preeminent among the innumerable signs and myriad lights of the pier and wonderfully illuminated Boardwalk



BRILL EXHIBIT AT THE A.E.R.A. CONVENTION. The pier during the Grand Ball on the last night of the Convention. The reception, entertainments and ball were all held on the pier this year, and each evening these well-planned and splendidly carried out functions was thronged with a brilliant assemblage

NEW EQUIPMENT FOR THE BEN-HUR ROUTE INTERURBAN TRAIL CARS

THE Danville Car Company recently delivered to the Indianapolis, Crawfordsville & Western Traction Company four trail cars of the type shown in the photographs. This road traverses a rich and populous farming section between Indianapolis and Crawfordsville, covering a distance of forty-five miles, and is well known as the "Ben-Hur Route." The numerous towns through which the road passes not only afford heavy traffic the year round, but also considerable express business. To meet the steady increase in traffic, trail cars are used in trains of two and three cars in the regular and frequent schedules. This type of car is familiar to readers of BRILL MAGAZINE, as it is largely used on the interurban systems of the middle west. The attractive appearance inside and out has proved to increase the number of pleasure riders on these lines, and in this case an excellent effect has been produced by the use of selected mahogany for

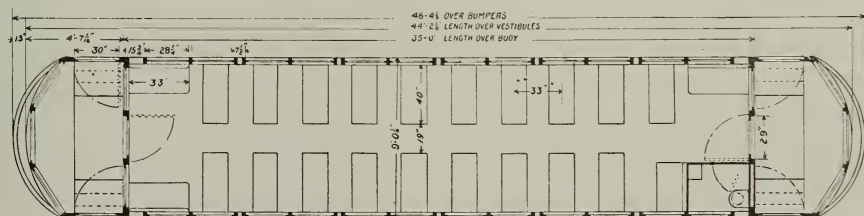


NEW EQUIPMENT FOR THE BEN-HUR ROUTE. Trains of two and three cars are operated on regular schedule on this forty-five mile line between Indianapolis and Crawfordsville



NEW EQUIPMENT FOR THE BEN-HUR ROUTE. The cars are finished in selected mahogany and have semi-empire ceilings. The seats are of the Brill "Winner" type

the interior finish, a semi-empire dome, and high-back plush covered seats with head rolls and mahogany arm rests. The finish is known as the sanitary style, as there are no carvings nor recesses where dust and dirt can lodge. The large lower sashes of the windows are arranged to raise their full height and are fitted with a style of sash-lock stops which enables them to be held at any desired height. A toilet room with



NEW EQUIPMENT FOR THE BEN-HUR ROUTE. The seat cushions and backs, the distance between the seats and the width of the aisles, are of generous proportions. Seating capacity, 46

standard fittings is located at a corner of each car. The bottom framing is of standard type, with inside and under trusses and double-trussed needle beams. Single swing doors are provided at the body and platform entrances, and trap doors of the latest type cover the platform step openings when the doors are closed.

Length of body	35 ft. 0 in.	From steps to platform,	
Length over platforms . . .	44 ft. 2½ in.	3—11½ in. steps	34½ in.
Length of rear platform . . .	4 ft. 7⅛ in.	Seating capacity	36
Centers of side posts	33 in.	Wheel base	6 ft. 0 in.
Width over sides	9 ft. ¼ in.	Diameter of wheels	46 in.
Extreme width	9 ft. 2 in.	Wt. of car body less elec.	
From track to sills	42½ in.	equipment	27,650 lbs.
From sills over trolley boards	9 ft. 7½ in.	Wt. of air brake equipment	350 lbs.
From floor to headlining . .	8 ft. 9¾ in.	Wt. of trucks	17,000 lbs.
From track to step	15¾ in.	Total weight	45,000 lbs.



CARS FOR PARKERSBURG, MARIETTA & INTERURBAN R. R.

BRILL No. 27-M.C.B.1 TRUCKS

THE city of Parkersburg is situated in the northwestern part of West Virginia, at the confluence of the Little Kanawha and Ohio Rivers. Being the second largest city in the state, it holds a prominent commercial position and is well known as a hardwood lumber center. The chief industries are the manufacture of shoes and furniture. The city serves as the eastern gateway for the Baltimore & Ohio Railroad to the middle west, and the Ohio River division of the same road passes through the city on its way to Pittsburgh. The Parkersburg, Marietta & Interurban Railway Company furnishes the city of Parkersburg with excellent transportation, and also reaches the fair grounds, about two miles

from the center of the city, and provides a populous intermediate section with a frequent car service. The chief feature of this system is its connecting line with the city of Marietta, Ohio, a distance of twelve miles, through which city its lines also operate. This is a single-track line, with stopping places at stipulated distances and traverses a well developed section, until Williamstown is reached, where the line crosses the Ohio River to Marietta, on the famous Marietta Suspension Bridge, which the company owns. One hour is consumed in making the trip from Parkersburg to Marietta, and cars leave the two



SEMI-CONVERTIBLE CARS FOR PARKERSBURG, MARIETTA & INTERURBAN R. R. These cars are of the standard 12-window Brill Semi-Convertible type and are mounted on Brill No. 27-M.C.B.1 trucks

cities every half hour. The G. C. Kuhlman Car Company recently furnished the company with a number of cars, of the type shown in the accompanying photographs, which is the standard type of the lines. The platforms are equipped with folding doors on either side and all passengers enter and leave by the rear platform in conformity with the road's operating conditions. Twenty Brill "Winner" transverse woven cane covered seats and two longitudinal seats at each end provide a seating capacity for forty-eight persons. The seats are provided with individual electric heaters which give the cars a comfortable temperature during the winter months. The windows are equipped with double sashes of the Brill semi-convertible type, both sashes sliding into pockets in the

roof when raised. A single row of fourteen lights placed along the center of the ceiling and one on each platform furnish ample light. These cars are mounted on Brill No. 27-M.C.B. 1 trucks, equipped with two motors each, and are capable of negotiating the steep grades encountered at a good speed and maintaining the fast service required. The under-



SEMI-CONVERTIBLE CARS FOR PARKERSBURG, MARIETTA & INTERURRAN R. R. The cars are suited to both summer and winter service by the Semi-Convertible feature. Seating capacity, 48

framing consists of 4-in. by 7 $\frac{3}{4}$ -in yellow pine outside sills, plated with 15-in. by $\frac{3}{8}$ -in. steel plates, and securely braced with 1 $\frac{1}{2}$ -in. steel undertruss rods. The center crossings are of 4 $\frac{1}{2}$ -in. by 5 $\frac{1}{2}$ -in. oak and the end sills of 5 $\frac{1}{4}$ -in. by 6 $\frac{7}{8}$ -in. oak.

Length of body	33 ft. 4 in.	Width over sills	7 ft. 11 $\frac{1}{2}$ in.
Length over platforms . . .	43 ft. 9 in.	Width over posts	8 ft. 2 in.
Length of platforms . . .	4 ft. 8 $\frac{1}{2}$ in.	Extreme width	8 ft. 5 $\frac{1}{4}$ in.
Centers of side posts . . .	2 ft. 8 in.	From track to sills	35 $\frac{1}{2}$ in.

From sills over trolley boards 9 ft. 4½ in.	Seating capacity	48
From floor to headlining . . 8 ft. 5 in.	Type of trucks . . Brill No. 27-M.C.B.-1	
From track to step 16¾ in.	Wheel base	6 ft. 0 in.
From step to platform . . . 15½ in.	Diameter of wheels	33 in.
From platform to floor . . . 10 in.	Weight of car and truck . .	32,880 lbs.



P-A-Y-E CARS FOR NORFOLK CITY & SUBURBAN RAILWAY BRILL PLAIN ARCH ROOF

THE Norfolk City & Suburban Railway Company has lately put in commission a number of Pay-As-You-Enter cars built by The J. G. Brill Company. These are the first prepayment cars for the lines and are well suited to the heavy morning and evening traffic between the city and the populous suburbs served. During the past year this same type of car has been furnished to many railways in various parts of the country and has been entirely successful in every case. The car was introduced by The J. G. Brill Company at the 1910 A. E. R. A. Convention and met with general approval, and the design has been specified in a large part of the



P-A-Y-E CARS FOR NORFOLK CITY & SUBURBAN RAILWAY. The platform railings, vestibule doors and folding steps are of standard forms. The cars are mounted on Brill No. 27-GE1 Trucks

orders for city cars received since that time. The same general design was exhibited at the Convention of this fall, as will be seen on page 282, and evidences the arrival of a body construction which may be considered the present standard for average city traffic conditions. The Brill Semi-Convertible Window System has long been widely established as a neces-



P-A-Y-E CARS FOR NORFOLK CITY & SUBURBAN RAILWAY. The Brill Semi-Convertible Window System obviates the use of wall window pockets and permits the seats to be brought between the posts, adding about seven inches to the interior width. Seating capacity, 44

sary feature of city car design, and in combination with the Brill Plain Arch Roof is improved to the extent of increasing height of the window openings and reducing the inward sweep of the upper part of the side posts. This roof is lighter by four or five hundred pounds than the old style and is stronger and can give better protection against moisture.

The following principal dimensions and weights apply to the car illustrated:

Length of body	30 ft. 8 in.	Type of trucks	No. 27-GE1
Length over platforms	42 ft. 8 in.	Wheel base	4 ft. 6 in.
Length of platforms	6 ft. 0 in.	Diameter of wheels	33 in.
Centers of side posts	2 ft. 8 in.	Size of journal	3¼ in.
Width over sills	7 ft. 11½ in.	Type of motors	G.E.-210—2-65 h.p.
Width over posts	8 ft. 2 in.	Weight of car body less elec. equipment	17,490 lbs.
Extreme width	8 ft. 5⅜ in.	Wt. of electrical equipment	2,000 lbs.
From track to sills	2 ft. 8¼ in.	Wt. of air brake equipment	1,500 lbs.
From sills to trolley board	9 ft. 3 in.	Wt. of trucks	12,000 lbs.
From floor to headlining	7 ft. 10⅛ in.	Wt. of motors	6,860 lbs.
From track to step	16 in.	Wt. of H. B. Life Guard	400 lbs.
From step to platform	13 in.	Total weight	40,250 lbs.
From platform to floor	10⅛ in.		
Seating capacity	44		



THE BRILL SENIOR THESIS CONTEST

THE jury of award, consisting of W. A. House, president United Railways & Electric Company of Baltimore, appointed by the American Railway Association; H. W. Blake, editor of the *Electric Railway Journal*, and S. M. Curwen, vice-president and general manager of The J. G. Brill Company, has rendered its decision on the relative merits of the theses submitted in the 1911 senior thesis contest for prizes of \$250, \$150 and \$100 offered by The J. G. Brill Company for the best thesis on the subject "Design of a Prepayment Car for City Service," which is as follows:

First prize and John A. Brill Memorial Medal: A. Herbert Packer, Armour Institute of Technology, Chicago.

Second prize: Charles F. Clise, Sheffield Scientific School, Yale University.

Third prize: Henry S. Bagley, department of electrical engineering, University of Arkansas.

In view of the fact that only five theses were submitted in the contest this year, it has been decided to discontinue the offer to the senior students of the engineering departments of universities and colleges.

A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

VII

THE trucks made by this company, beginning with the composite truck yept No. 13, have progressed in annual degree since 1887. Every year has marked distinct improvements keeping pace with the rapid growth in capacity of lines by which, from transmogrified horse cars with runs of a half dozen miles, to interurban roads of five hundred miles employing cars about as large as the coaches on trunk lines the trucks have been made for. Selecting a few of these trucks—the several types used for four-wheeled cars; the Maximum Traction trucks for use on sharp curves and requiring but one motor for each truck—the 39-E truck of same type; these two being the standard on the Metropolitan and Third Avenue lines, New York City; the several types embodying the improved method of lateral swing and low-hung brake supports, by which an admirable and previously unequalled adherence to the rails was effected, and later the ingenious modifications of what is known as the Master Car Builders' standard. These trucks, of the largest type, are used on lines operating with high speed and on elevated lines. At the present time the leading styles of trucks being built for electric propulsion are:

For four-wheeled cars, the No. 21-E; for eight-wheeled cars, with sharp curves and easy grades, the one motor per truck No. 22 or the 39-E; for lighter traffic eight-wheeled cars, short wheel base No. 27 type. For heavy work eight-wheeled cars, 27-F or M. C. B. No. 1, 2 or 3.

Following soon upon the establishment of this new article of manufacture by the Brill Company, several parties fell in line and began to make trucks for electric cars. "Imitation is the sincerest flattery" and the Brill Company was flattered enormously, as all imitated like Chinamen, even to the specific names by which the Brill Company designated their trucks.

The march of improvement in cars has been kept up by the Brill Company, and electric cars from the smallest to the largest have been and are being built, as also divers other vehicles such as snow sweepers, sprinkling cars with reach of current to cover avenues eighty feet wide and which, if for use on lines not subtended by fire plugs, are capable of sucking the water from wells or streams; light freight and sugar cane cars for southern countries; funeral cars; dump cars; cars for inclined planes; cars of the highest grades as sleeping cars, dining cars, officers' cars. Soon after the year 1900, to wit, in 1902, the company finding their home works crowded with work and seeing the advantage in the saving of freight charges for work for remote points, decided to buy a car works in the middle west and, having been urged to take the American Car Works, at St. Louis, bought the plant and have since directed its operation. Later, in March, 1904, the G. C. Kuhlman Car Company, at Cleveland, was offered and taken on the same lines, as also in December, 1904, the John Stephenson Company; and, in 1906, the Wason Manufacturing Company, the oldest passenger car builder in the United States.

In 1906, the second loss met by the Brill Company since its inception, in the loss by death on March 31, 1906, of George Martin Brill. The impression made personally upon his colleagues who survived him are well set forth in the brief address of James Rawle, his successor in the office of President, to the officials and employees:

ADDRESS TO OFFICIALS AND EMPLOYEES OF J. G. BRILL COMPANY
UPON ASSUMING THE PRESIDENCY

April 9th, 1906.

Officials and Employees of J. G. Brill Company.

GENTLEMEN AND FRIENDS:—The finest man in the world and the best friend has been suddenly taken from our midst. As he has lived for these thirty-eight years with the cares and

hopes as well as with the rewards of our great business upon and surrounding him, so has he died—in the harness like a gallant Knight.

I thank God and I thank you all that these cares were lightened, these hopes were brightened, these rewards were made more solid by reason of the zeal and loyalty of each and every one of you. And I feel sure, too, that each and every one of you is glad and proud to be an integral part of the J. G. Brill Company, a name which is like a household word, entrenched as it is in every land, with its products like life-giving blood flowing in the arteries of travel, producing wealth and nourishment and acting to break down the barriers of heathendom and ignorance. From Nova Scotia to Patagonia on the east—from Patagonia to Vancouver on the west—in all the countries of Europe, England, France, Germany, Italy, Spain—in Africa where Moors and Turks formerly resisted the nobility and chivalry of the Crusaders, it is planted—and in the south where Hottentot and Kaffir stalked the deserts they can ride for a nickel. In the Great Archipelago where Bushmen ranged and raged—in Ceylon, Borneo, Korea, Japan—if they know but one English name, I venture to say it is "Brill." This proud position has been achieved, not by conquest and taking their lands and their possessions, but by aiding them to fall in line with the march of improvement.

It is a sad day to me on which I am called upon to take up the burdens which my dear friend has laid down, and I need all of your help and continued allegiance to aid me in filling his place.

And this need is the greater by reason of the fact that his illness has prevented for many months John A. Brill from being in our midst. In all that time, on many days with his frame racked with pain, he has not failed to have us all and our work in his mind, and to give us his best and most valuable thoughts and counsel. We hope and feel that before many more months have passed he will be once more with us, restored to health.

I count upon your allegiance and support and feel sure that I do not count in vain.

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

**American
Car Company**
St. Louis, Mo.

**G. C. Kuhlman
Car Company**
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

**Wason
Manufacturing Company**
Springfield, Mass.

**Danville
Car Company**
Danville, Ill.

COMPAGNIE J. G. BRILL

14 Place de Laborde, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
409 Monadnock Building
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Mart'n 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Belgium and Holland

C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai

Italy

Giovanni Checchetti, Piazza Sicilia, 1, Milan



BRILL SNOW PLOWS

As these cars are subjected to severe strains and shocks, they are designed and built in a manner which long experience has proved to afford the greatest resistance power against the particular stresses imposed. No unnecessary weight has been incorporated in the double-truck plow cars, as the plows are removable and the cars are used in baggage and express service during the greater part of the year. The plowshares are designed to reduce the impact of the snow to the minimum consistent with operating conditions and thus increase the rate of speed to which the cars may be put while negotiating deep or drifted snow. The plows are raised or lowered on substantial guides which are bolted and braced to the car sills and are amply strong to resist the severest strain made by deep or firmly packed snow. The plow lifts are arranged for operation by either air power or hand, or both. In every detail, as well as in the general plan, these plow cars have been developed to the most advanced stage of efficiency and are capable of meeting all demands of modernly equipped maintenance - of - way departments of city and interurban railways.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



Spring Street
Los Angeles



MOTORMEN'S ADJUSTABLE SEATS

The saddle type has a pin adjustment for height and folds against the dasher. The circular type has a screw adjustment for height. The provision of motormen's seats is directly in line with modern efficiency methods.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



John D. McArthur

PRESIDENT, AMERICAN ELECTRIC RAILWAY ASSOCIATION
PRESIDENT, PUBLIC SERVICE CORPORATION OF NEW JERSEY

BRILL MAGAZINE

Vol. V

NOVEMBER, 1911

No. 11

THOMAS N. McCARTER

[WITH PORTRAIT INSERT]

THOMAS NESBITT McCARTER, president of the Public Service Corporation of New Jersey, was born in Newark, N. J., in 1867. His early education was received at Newark Academy and at Pingry School, Elizabeth. He graduated from Princeton University in 1888, and after studying law at Columbia Law School and in the office of his father, who was one of the recognized leaders of the American Bar, he became a member of the firm of McCarter, Williamson & McCarter, till 1899. He was judge of the First District Court, Newark, for the last three years of this period and wrote "McCarter's New Jersey District Court Practice." Retiring from the bench to represent Essex County in the State Senate, he was elected leader and afterward successfully managed a state campaign resulting in the election of a governor and another which led to the election of a United States senator. In 1902 Mr. McCarter became general counsel for the Fidelity Trust Company, one of the largest financial institutions in New Jersey, and about this time was appointed Attorney-General of the State for a term of five years. The year following he was chosen to serve on a committee with John I. Waterbury, John D. Crimmins, the late A. J. Cassatt and the late E. F. C. Young, for devising a plan to rehabilitate and develop street railway and other properties in New Jersey. This led to the organization of the Public Service Corporation of which he was prevailed upon to accept the presidency. Under his management the original combination of eight or ten railways and several gas and electric properties with a gross revenue in 1903 of \$10,000,000, has grown to a \$30,000,000 business serving 193 municipalities, having a combined population of over 2,000,000, with one of more forms of public utilities. Mr. McCarter was elected president of the American Electric Railway Association last month.

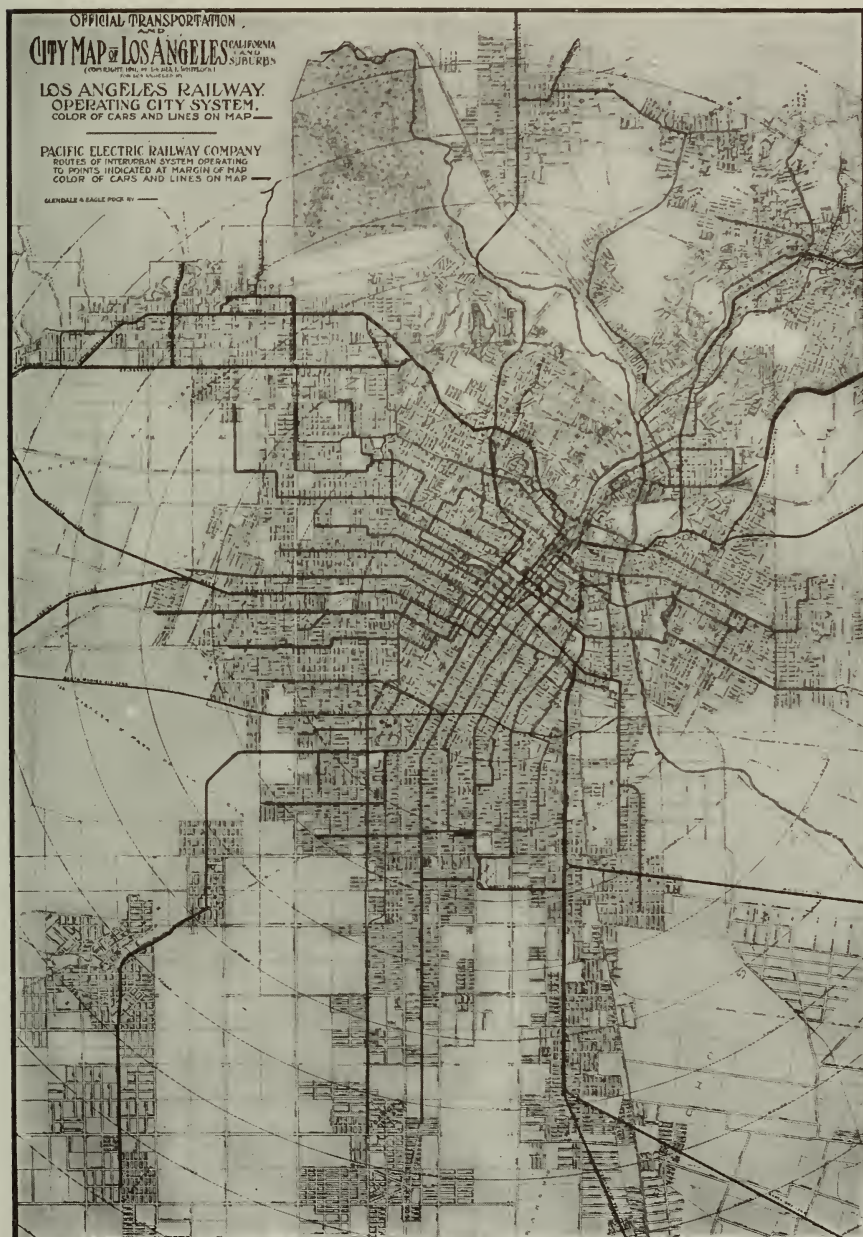
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

LOS ANGELES *

LOS ANGELES is the third city in size in the United States west of the Mississippi River, and has a population of 319,198 according to the census of 1910. It is situated in lower California, about 20 miles from the coast, on a level tract of land a few miles to the south of a precipitous mountain range whose foothills extend across the northern part of the city. Los Angeles has had a phenomenal growth from the year 1885, when the first of the four transcontinental lines, which now converge at this point, was completed. The population at that time was under 15,000; today it stands among the most modern and progressive cities of the United States, with advantages and resources that assure its continued rapid growth and prosperity. Besides being the commercial center for a large section of the southwestern part of the United States, it does an enormous export business in fresh and dried fruits, vegetables in great variety, beans, wines and brandies, wool, honey, canned goods, sugar, olives, wheat, corn, barley, petroleum and its by-products. The mild and delightful climate during all seasons of the year is greatly in its favor and has given it a world-wide fame as a health resort. Los Angeles has about 2500 manufacturing establishments, whose products last year aggregated \$75,000,000. In addition to the city's importance as the radial point of transcontinental railways, it ranks among the first electric inter-urban centers of the country. These systems extend in all directions from their termini at the center of the city.

The city electric railway lines are operated by the Los Angeles Railway Corporation, which is a part of the "Hunt-

* The thirty-fifth article of this series.



Reproduced from map published by the Los Angeles Railway

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The gray lines represent the city railways and the darker lines show the interurban systems. The concentric circles indicate distance in miles from the center of the city

ington System." The trackage of the city lines comprises 345 miles, and the company has 650 motor and about 700 other cars. The accompanying map shows the street layout of the city and the arrangement of the well-planned and comprehensive trolley system. The Pacific Electric Railway, which is also a part of the "Huntington System," despatches daily from its terminal building, in the heart of the business district, about 1500 interurban trains of two to four cars. The Los Angeles-Pacific Company serves a large territory to the west and southwest of the city and operates a high-speed



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The Los Angeles type of car has proved its entire suitability by ten years of service. The platforms are being lengthened on all these cars to include the pay-as-you-enter system of fare collection

service at frequent intervals. The traffic to the beach resorts on both interurban systems is exceptionally heavy on Sundays and holidays, while the regular service is constantly requiring additional cars. The cars on the interurban lines have their regular points within the city limits for taking on and letting off passengers, and although the majority of passengers are carried between the city terminals and outlying points on the interurban systems, a considerable number of passengers use the cars for transportation between the business district and the immediate suburbs.

The central part of Los Angeles is a scene of great activity, as the retail and wholesale districts adjoin and the large



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Spring Street, looking north from Alexandria Hotel. The switching and signaling tower shown in the foreground is a unique feature of the railway system and is found at principal crossings. The tower is $3\frac{1}{2}$ ft. wide and mounted on a tubular steel post

office buildings, hotels and theaters are in this section. The streets are wide and well paved, but the fact that the city has more than trebled its population in ten years, and the surrounding towns, cities and districts reached by the electric lines have grown proportionally, has produced a congestion of traffic during the rush hours which has arrived at an acute



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Looking down Broadway, showing the Los Angeles County Court House at the left. Broadway runs parallel with Spring Street, with which it converges at the center of the city

stage. The great interurban terminal of the Pacific Electric Railway, which was completed but a few years ago, did not contemplate in its arrangement such an enormous addition to the population tributary to the center of the city. The interurban cars use some of the same streets in the business district occupied by the city system and also streets which intersect crowded thoroughfares having city lines, with the result that morning and evening schedules are interrupted at the terminal building, and at a number of points in the adjacent streets, by cars so crowded as to make loading and unloading

difficult and slow, and holding up long lines of cars which continually conflict with the heavy traffic on intersecting main arteries of travel. Much of the car congestion is due to the large increase in the vehicular traffic in this section, which unfortunately is at its height at times which coincide with the hours of heaviest railway travel. The railway com-



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Grand Avenue is a busy thoroughfare in the shopping district. Note the absence of trolley poles; on business streets the span wires are supported from the buildings

panies are planning radical changes in the terminal facilities to separate the city and interurban lines, and when an agreement has been reached with the municipality for the use of the streets necessary to their plans, will be ready to make the necessary additions and changes. A considerable number of pay-as-you-enter cars have been put in operation on the lines most affected, and other cars of this class are being added as rapidly as possible.

The type of car used is that known as the "California," as it originated in this State and is chiefly used in the Pacific

Coast region. The climate would permit of an entirely open car being used were it not for the cool evenings and also that a proportion of the passengers prefer to ride in a closed compartment. The combination, therefore, of a closed and open car with the closed part at the center was adopted before the days of electric traction and has continued to be a popular type in this region. It is, of course, lighter and less expensive than an entirely closed car and obviates the use of a mixed equipment of open and closed types. While the "California" type originated in San Francisco, it is now more particularly the Los Angeles type, as this is the largest city in which it is in standard use.

These cars are 39 ft. 2 in. over the bumpers, 38 ft. over the vestibuled ends, the closed compartment measures 14 ft. 8½ in. and the over-all width is 8 ft. 3 in. The bottom framing is composed of yellow pine side sills, reinforced on the outside



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Looking down Hill Street towards the center of the city. Two of the interurban lines running out of the northwestern section of the city use the tunnel whose portal is in the foreground



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The "Angel's Flight" is a short incline railway in the northern part of the city which furnishes transportation from a business street to a populous residence district on the heights

by 7-in. by $\frac{1}{2}$ -in. steel plates, and cross sills of white oak. Substantial undertrusses at the center, and platform sills of oak, assist in giving adequate support to heavy loads. Ash is used for the body framing and the roof is reinforced with steel carlines at each post. Single sliding doors and longitudinal seats are used in the closed compartment; the seating capacity of this compartment is 18 and of the entire car 42. The five pairs of sashes on each side of the closed compartment are stationary; the bottom end sashes are arranged to drop and the ventilator sashes are equipped with openers; the sashes in the vestibuled ends are stationary. The open sections are protected by curtains which extend to the floor. The bolster centers are placed 23 ft. apart, and the trucks have a wheel base of 5 ft. 3 in. The weight of the car body fully equipped is 29,000 lbs.

The company has adopted the pay-as-you-enter system of



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. The Boardwalk at Venice, a popular beach resort. The traffic on the lines reaching the various beaches is heavy on Sundays and holidays throughout the year, as the cars are comfortable and fast, the scenery beautiful, the beach attractions varied, and the bathing equally pleasant summer and winter

fare collection, as has been mentioned, and has rebuilt a number of its older cars to adapt them to prepayment service. The change has been accomplished by lengthening the platforms 3 ft. 6 in., making the cars 44 ft. 8 in. over the ends and lengthening the truck centers to 29 ft. Dropped platforms cannot be used, as the short track radius at a number of street corners is prohibitive. This necessitates the use of double steps, although the car is carried as low as possible by mounting on 30-in. wheels. The platforms are equipped with hinged lattice gates held in position by substantial locks; the gates fold together to form a partition between the entrance and exit passages. The front exit is closed with a sliding lattice gate operated by a pneumatic device with a valve connected with the air-brake line. All changes made in the rebuilding of these cars conform to standards adopted by the company, and every part is interchangeable.

STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA

BRILL No. 27-M.C.B.3 TRUCKS

THE Philadelphia Rapid Transit Company has received 30 steel cars for the Market Street elevated and subway system from The J. G. Brill Company. These cars were ordered July 9, for delivery October 15 to November 15. The first car was delivered October 9 and the last car November 11, completing the order in 110 working days.

The underframe consists of $\frac{5}{16}$ -in. cold rolled steel plate of fishbelly form, $22\frac{1}{8}$ in. at the wider part and reinforced at top and bottom by $3\frac{1}{2}$ -in. by 3-in. by $\frac{7}{16}$ -in. angles; the stringers are $11\frac{1}{4}$ -in. by 8-in. channel section; end sills, $7\frac{1}{2}$ -in. by $\frac{3}{8}$ -in. steel plate reinforced with $3\frac{1}{2}$ -in. by $3\frac{1}{2}$ -in. by $\frac{7}{16}$ -in. angles top and bottom; the crossings are composed of 5-in. by $\frac{3}{8}$ -in. bars. The flooring is of monolithic construction, the monolith being laid on corrugated sheets having continuous strips riveted thereto. The side framing is composed of $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $\frac{5}{16}$ -in. tees attached to the



STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA. The side sills are made of $\frac{1}{8}$ in. steel and measure $22\frac{1}{8}$ in. wide at the center; the stringers are $11\frac{1}{4}$ -in. by 8-in. channels. Weight of underframe, 8,630 lbs.

angles at the top of the side sills by forged corner brackets. Steel plates of $\frac{1}{8}$ -in. thickness are used for the sheathing, with pressed steel capping for the window sills. Wooden belt rails, window posts and top plates are fitted into the steel framing, and to these wooden members are secured the solid mahogany panels and facing which constitute the interior



STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA. The side posts are composed of $2\frac{1}{2}$ -in. by $\frac{3}{16}$ -in. T section; $\frac{1}{4}$ -in. steel plates form the outside sheathing. The roof is of wood with steel rafters at each post

finish. The roof is of wood of regular construction reinforced with steel carlines and having ceilings of Gardener board. There are six pairs of bronze standard automatic ventilators to each side of the monitor deck. Frosted glass is used in the ventilator sashes.

The vestibule side doors and center doors are arranged to be operated pneumatically from either end of the car and slide into pockets 2 in. wide. The doors are hung with anti-fric-

tion sheaves and are fitted with polished bronze anti-rattlers. All the pneumatic doors are hung in a manner to enable them to be operated freely by hand and are of the "Easy-Access" type, with mechanism furnished by the Burdett-Rowntree Co., including the door guides. The opening between the vestibule door posts is 2 ft. 9 in., and of the side doors 3 ft.



STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA. The flooring is of monolithic construction laid on corrugated sheets: the monolith is brought under the seats to the side lining

4 in. in the clear. Tubular rubber bumpers are provided for the doors to strike against in closing. The operating handles for opening and closing the side doors are located on the end sheathing of the vestibules at either side of the sliding door which gives access from one car to another.

Motormen's cabs are provided at diagonal corners of the car on the right-hand side looking forward. The cab is enclosed by a hinged door which is arranged to fold against the

controlling apparatus, and the motorman's seat folds within this door, while a corner of the enclosed space is found for an electric heater.



STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA. The controlling apparatus, switch for electric heaters, motorman's seat, etc., are enclosed by a hinged door which also serves to form a cab of this part of the platform

The switch for the electric heaters is located at the side of the controlling apparatus. The switch panel is located at one end of the car against the bulkhead on the side opposite the motorman's cab. On the left-hand corner of each car, opposite the motorman's cab, is attached a safety gate of the pantagraph type, which is latched to the next car to protect passengers on the station platforms from being pushed into the opening between the cars.

The window sashes are made of mahogany $1\frac{3}{16}$ in. thick, the lower sash being stationary and the upper



STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA. Thirty of the cars were built at the Brill Works in 110 working days. The cars are all mounted on Brill No. 27-M C.B.3 Trucks

sash arranged to drop; $\frac{1}{8}$ -in. polished plate glass is embedded in putty and put in from the outside. The side windows, excepting at the door pockets, are fitted with Pantasote curtains



STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA. The upper window sashes slide down outside the lower, which are stationary. Seating capacity, 44



STEEL CARS FOR THE MARKET STREET ELEVATED, PHILADELPHIA. The handles for pneumatically operating the side doors are shown at either side of the end door. The gate latches to the next car for the protection of passengers at station platforms

arranged to roll over the back of the rollers instead of the front.

The seat frames have a $\frac{1}{4}$ -in. drop in their width and the backs are made in four sections, between the center door and the end of the car, and hinged to the window sill. The seat frames and the canvas backing to the woven cane covers are fireproof.

Brill No. 27-M.C.B.3 trucks are used under all of the cars. The truck at one end of the car is equipped with two motors of 125 h.p.

each and the truck at the other end is for trail operation.

Length of body	40 ft. 2 $\frac{1}{4}$ in.	Size of journal	5 in.
Length over platforms	49 ft. 7 in.	Type of motors	G.E.-66—2-125 h.p.
Length of platforms	4 ft. 8 $\frac{3}{8}$ in.	Wt. of car body less elec. equip.	32,000 lbs.
Centers of side posts	2 ft. 8 $\frac{1}{2}$ in.	Wt. of electrical equipment	2,500 lbs.
Width over sills	8 ft. 7 in.	Wt. of air brake equipment	1,500 lbs.
From track to floor	4 ft. 1 in.	Weight of trail truck	11,500 lbs.
From track over roof	12 ft. 11 in.	Wt. of motor truck	12,900 lbs.
Seating capacity	44	Wt. of motors	8,750 lbs.
Type of trucks	Brill No. 27-M.C.B-3	Total weight	69,150 lbs.
Wheel base	6 ft. 8 in.		
Diameter of wheels	34 in.		

SINGLE-TRUCK P-A-Y-E CARS FOR SAGINAW, MICH.

STEEL UNDERFRAMES

IT is seldom that single-truck cars are of such an interesting design as the type shown in the accompanying photographs. Seven of these cars were lately furnished to the Saginaw-Bay City Railway Company, which operates all of the street lines in Saginaw and Bay City, Michigan, and the interurban railway between the two cities. These are the first prepayment cars used on the system and have met with the entire approval of both managers and patrons. Besides



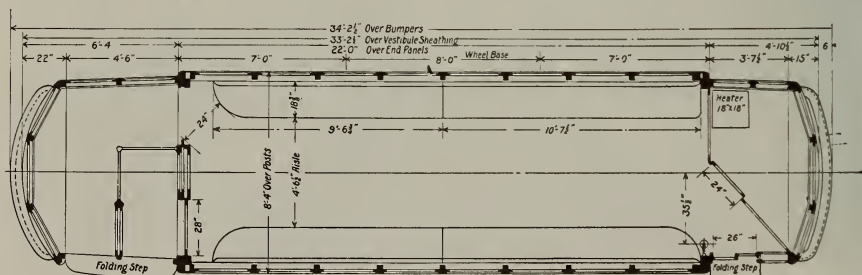
SINGLE-TRUCK P-A-Y-E CARS FOR SAGINAW, MICH. The bulkhead is omitted from the forward end. The lower part of the diagonal partition of the motorman's cab is glazed and also the lower part of the exit door, to enable the motorman to watch outgoing passengers to better advantage



SINGLE-TRUCK P-A-Y-E CARS FOR SAGINAW, MICH. The body is a trifle longer than customary, and the prepayment platform and front platform with heater, produce stresses unusual to a single-truck type, but ample provision for support and durability is provided by the steel underframe. These cars are all mounted on Brill No. 21-E Trucks

the very unusual feature of a steel underframe for a single-truck type, the cars are arranged for the standard single-end pay-as-you-enter fare collection system and include a motorman's compartment with a diagonal partition at the right side, glazed below as well as above, to enable the motorman to watch outgoing passengers, and having the exit door glazed in the lower panels. No bulkhead is used at the forward end of the body.

The steel underframe of the cars consists of 8-in., 25 $\frac{1}{4}$ -lb. I-beam sub-sills which support 4-in., 5 $\frac{1}{4}$ -lb. channel crossings with broad gusset plates at the ends, to which are riveted



SINGLE-TRUCK P-A-Y-E CARS FOR SAGINAW, MICH. The rear vestibule doors are hinged to a central wooden post and fold back-to-back as shown. The front exit door and mutually-operating step are controlled by the motorman. Seating capacity of car, 30

3-in. by 2-in. by $\frac{3}{8}$ -in. angle irons extending the full length of the body, to which in turn are riveted 12-in. by $\frac{1}{4}$ -in. sill plates reinforced near the upper edge with 2-in. by $\frac{1}{2}$ -in. steel bars. Four 4-in., $5\frac{1}{4}$ -lb. channels are riveted to the sill angles and to the under web of the I-beam sub-sills forming tension trusses to resist deflection of



SINGLE-TRUCK P-A-Y-E CARS FOR SAGINAW, MICH. The main members of the underframe consist of two 8-in. I-beam sub-sills, 9-in. channel end sills and 12-in. by $\frac{1}{4}$ -in. sill plates

the side sills produced by platform stresses. The end sills are composed of 9-in., $13\frac{1}{4}$ -lb. channels. A powerful support is obtained for the platforms at either end by the use of channel steel knees and two inside platform sills made of 4-in. by 3-in. by $\frac{1}{2}$ -in. angles. This steel underframe forms a rigid structure for the body, which is a trifle longer than usual for a single-truck type, and for the support of the long pay-as-you-enter platform at the rear, and also for the shorter front plat-



SINGLE-TRUCK P-A-Y-E CARS FOR SAGINAW, MICH. Four 4-in. channels riveted to the side sills and brought down to the under web of the I-beam sub-sills assist in securing the side sills against deflection

form which has the weight of a heater and the diagonal partition for the motorman's cab to support.

The side posts are $2\frac{3}{4}$ in. thick and the corner posts $3\frac{5}{8}$ in. and have a sweep of $1\frac{3}{4}$ in.; the roof is strengthened with concealed steel rafters, $\frac{5}{8}$ in. thick. Between the entrance and exit doors of the rear vestibule is a post to which these doors are hinged and which is provided with a grab handle. The diagram shows the location of the pay-as-you-enter railing and the other principal features of the entrance, exit, seating and platform plans; the photographs show the other features of these remarkably interesting cars. Brill single-trucks of the No. 21-E type are used under all the cars, the I-beam sub-sills of the body framing resting directly on the upper chords of the truck.

Length of body	22 ft. 0 in.	From sills over trolley boards	9 ft. $6\frac{1}{4}$ in.
Length over platforms	33 ft. $2\frac{1}{2}$ in.	From floor to headlining	8 ft. $7\frac{1}{4}$ in.
Length of front platform	4 ft. $10\frac{1}{2}$ in.	From track to step	$15\frac{3}{8}$ in.
Length of rear platform	6 ft. 4 in.	From step to platform	$14\frac{1}{2}$ in.
Centers of side posts	2 ft. $7\frac{1}{4}$ in.	From platform to floor	9 in.
Width over sills	8 ft. 4 in.	Seating capacity	30
Width over posts	3 ft. 6 in.	Type of trucks	Brill No. 21-E
Extreme width	8 ft. 7 in.	Wheel base	8 ft. 0 in.
From track to sills	$26\frac{5}{8}$ in.	Diameter of wheels	33 in.



FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM

SEMI-STEEL CONSTRUCTION

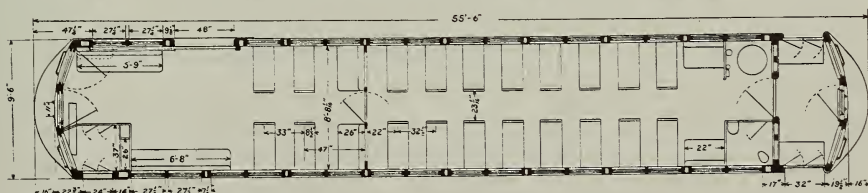
TEN interurban passenger and baggage motor cars and 5 observation parlor trail cars recently put in service on the lines of the Illinois Traction System were built by the Danville Car Company, and, as the photographs show,



FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM. Ten of these semi-steel motor cars and five semi-steel observation parlor trail cars were built by the Danville Car Company

are fine examples of interurban car design and construction. The cars were built to the designs and specifications of the railway company and have proved satisfactory in every respect. Six of the motor cars are in use in limited trains on the Chicago, Ottawa & Peoria Railway, operating over a 63-mile stretch between Morris and Princeton, and about December 1st, will run 22 miles further east, to Joliet. This division of the system is noted for being one of the finest scenic routes in the country and traverses a region of rugged grandeur. The other four cars are used in special high-speed service on other parts of the system and the five parlor trail cars are used in regular service between Danville, Urbana, Champaign, Decatur and Springfield; Peoria, Bloomington and Decatur; Peoria, Lincoln, Springfield and St. Louis.

The motor cars are arranged for single-end operation and are divided into two compartments, the main compartment seating 36 passengers and the smoking and baggage compart-



FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM. The main compartment has a seating capacity of 36 and the smoking compartment 27, including 6 folding camp stools

ment seating 21 passengers on stationary seats and 6 on camp stools, a total of 63 persons.

The underframes are made up chiefly of four 6-in., 12 $\frac{3}{4}$ -lb. I-beams extending through to the bumpers at each end and having yellow pine fillers; and 18-in. by $\frac{1}{4}$ -in. steel side-sill plates with a 4 $\frac{3}{4}$ -in. by 7 $\frac{3}{4}$ -in. wooden sill on the outside and



FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM. The forward end of the smoking compartment is arranged to receive baggage. The longitudinal seats fold compactly and the baggage door is of ample width. The motorman's cab, at the left, has outside and inside doors

another 3-in. by 5 $\frac{3}{4}$ -in. on the inside. The sill plates have 3-in. by 3-in. by $\frac{3}{8}$ -in. angles on the inside at top and bottom. The I-beam stringers are reinforced over the bolsters by 4-in. by 4-in. by $\frac{1}{2}$ -in. angles, 8 ft. long. Hollow malleable iron spacing blocks are placed between the longitudinal members and have $\frac{3}{4}$ -in. tie rods terminating at the center sills secured to the longitudinal members; this arrangement provides space

for cables and air pipes. The bolsters are made of steel plates, with the upper member 12-in. by 1-in., and the lower 12-in. by $1\frac{1}{8}$ -in. sections. The main trussing consists of $1\frac{1}{2}$ -in. rods under the side sills and double trusses of $\frac{7}{8}$ -in. rods for the needle-beams. Inside trusses of $1\frac{1}{2}$ -in. by $\frac{3}{8}$ -in. section are anchored under the body corner posts in heavy malleable iron



FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM. Looking towards the rear from the center of the smoking compartment. The windows are all equipped with two sets of sashes. Honduras mahogany is used for the interior finish

castings. Hedley anti-climbers are attached to the bumper facing and the bumpers are backed with heavy white oak members attached to the ends of the center stringers. Couplers of the Bosenbury type, standard on the Illinois Traction System, are installed at both ends. Each car has one steel angle pilot held by angles and hydraulic tubing at an elevation of 10 in. above the rails.

The bottom framing has $2\frac{1}{4}$ -in. by $4\frac{3}{4}$ -in. side posts, with

$\frac{1}{2}$ -in. tie rods at the single as well as at the double posts. The plain arch roofs are supported on ash rafters sandwiched between $1\frac{3}{4}$ -in. by $\frac{1}{2}$ -in. steel carlines. The outside of the car is sheathed with $\frac{13}{16}$ -in. yellow pine boards covered with No. 14 sheet steel.

All the windows of the cars have two complete sets of sashes, the outer set being arranged to be removed by unscrewing battens at the sides. The glass in the outside sashes is put in from the outside, while the inside sashes have the beading on the inside. The arched upper sashes on the inside are arranged to raise to permit cleaning; the lower inside sashes can be raised 24 in. above the arm rail. Metallic weather strips are used on all outside sashes and doors.

Honduras mahogany is used for the interior finish above the arm rails, and No. 14 sheet steel is used below and is painted and grained to match the mahogany. The headlinings are composed of 3-ply poplar veneer. The motorman's cab is located at the forward left hand corner of the car and is enclosed with a sheet steel partition. The cab contains a switch cabinet lined with $\frac{3}{8}$ -in. transit board; a double folding door glazed in the upper part is in the side of the car and



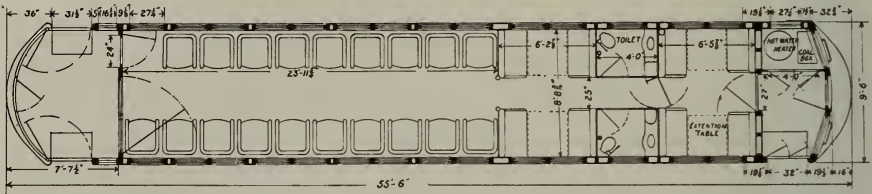
FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM. The class of service furnished on the McKinley System, which has a combined city and interurban trackage of 750 miles is indicated by these cars



FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM. With the comforts these splendid cars offer and with speed and beautiful scenery added, the Illinois Traction System has attracted a large volume of travel to its through trains between St. Louis, Springfield, Peoria and other main points on the lines

a double folding door gives access to the baggage and smoking compartments. The passenger compartments and motorman's cab are ventilated by Globe ventilators fitted with bronze registers. A pantagraph gate of channel iron encloses the baggage door opening in addition to the sliding door. The Peter Smith hot water system having three rows of pipe on each side of the car, and a complete set of the Consolidated Heating Company's electric heaters, comprise the heating arrangement. The cars are very completely equipped with safety devices and conveniences for the high-class service required on the McKinley System.

The observation cars have the same general framing, roof and window construction. The first section consists of a men's smoking compartment equipped with extension tables, which



FINE INTERURBAN PASSENGER AND PARLOR CARS FOR THE MCKINLEY SYSTEM. The cars are divided into smoking, club and general compartments, seating 35 persons in all.
The observation platform seats 10 to 15

is followed by men's and women's wash rooms, after which comes the club compartment, also furnished with extension tables. A decorative arch partition is supported on mahogany columns and separates the latter from the general or observation section in which are 19 chairs of comfortable styles, upholstered in Spanish leather. The observation platform will seat 10 to 15 persons; a single door at the side leaves the rest of the bulkhead free for a large plate glass window.

The principal dimensions and weights of the 10 passenger and baggage cars are as follows:

Length of body	48 ft. 3 $\frac{3}{8}$ in.	From side sills over trolley boards	9 ft. 7 $\frac{5}{8}$ in.
Length over platforms	52 ft. 10 in.	From floor to headlining	8 ft. 5 $\frac{5}{8}$ in.
Lgth. of body over bumpers	55 ft. 6 in.	Truck wheel base	6 ft. 6 in.
Length of rear platform	4 ft. 6 $\frac{3}{8}$ in.	Diameter of wheels	35 in.
Length of baggage and smoking compartment	20 ft. 9 $\frac{1}{8}$ in.	Type of motors	West. 303—4—90 h.p.
Length of passenger comp.	27 ft. 6 $\frac{1}{2}$ in.	Weight of car body less elec. equipment	49,460 lbs.
Centers of side posts	2 ft. 8 in.	Wt. of electrical equipment	3,200 lbs.
Width over sills	9 ft. 6 in.	Wt. of air brake equipment	2,940 lbs.
Width over posts	9 ft. 6 in.	Wt. of trucks	22,500 lbs.
Extreme width	9 ft. 9 in.	Wt. of motors	15,900 lbs.
Seating capacity	61	Total weight	94,000 lbs.
From track to side sills	3 ft. 5 in.		

The principal dimensions and weights of the 5 observation parlor trail cars are as follows:

Length of body	42 ft. 0 $\frac{1}{8}$ in.	Extreme width	9 ft. 9 in.
Length over platforms	54 ft. 2 in.	From track to sills	3 ft. 5 in.
Lgth. of body over bumpers	55 ft. 6 in.	From sills over trolley boards	9 ft. 7 $\frac{5}{8}$ in.
Length of front platform	4 ft. 6 $\frac{3}{8}$ in.	From floor to headlining	8 ft. 5 $\frac{5}{8}$ in.
Length of rear observation platform	7 ft. 7 $\frac{1}{2}$ in.	Seating capacity	35
Length of observation compartment	23 ft. 11 $\frac{3}{4}$ in.	Truck wheel base	7 ft. 0 in.
Length of smoking comp't	6 ft. 5 $\frac{3}{8}$ in.	Diameter of wheels	35 in.
Length of club section	6 ft. 2 $\frac{7}{8}$ in.	Wt. of car body less elec. equipment	46,600 lbs.
Centers of side posts	2 ft. 8 in.	Wt. of air brake equipment	700 lbs.
Width over sills	9 ft. 6 in.	Wt. of trucks	23,200 lbs.
Width over posts	9 ft. 6 in.	Total weight	70,500 lbs.

LARGE SEMI-CONVERTIBLE CARS FOR WILKES-BARRE, PA.

BRILL PLAIN ARCH ROOF

THE Wilkes-Barre Railways Company a few weeks ago received from The J. G. Brill Company 20 cars, of which 14 have 34-ft. bodies and are equipped with pay-as-you-enter platforms, and 6 have 37-ft. 5-in. bodies, straight sides



LARGE SEMI-CONVERTIBLE CARS FOR WILKES-BARRE, PA. Of the 20 cars in this order, 14 were of the above type equipped with P-A-Y-E platforms. All of the cars are mounted on Brill No. 27-M.C.B.1 Trucks

and vestibuled platforms of regular type. All of the cars are mounted on Brill No. 27-M.C.B.1 trucks. With the exception of the difference in the length of the body and platform arrangements, the cars are practically the same, and have smoking compartments seating 12 passengers and the standard Brill semi-convertible window system in which the lower sash, on being raised, automatically carries the upper sash into the roof pocket, leaving the window openings entirely free of sashes. The sash stiles are of brass and the glass is set in felt. Nine-inch screens guard the lower part of the window openings and are placed two inches above the belt rail. The roofs are of the Brill plain arch type reinforced with steel rafters $\frac{5}{8}$ -in. thick at every side post, and have ceilings

of Agasote painted robin-egg blue. Seven Globe ventilators are placed along the center of the roof; two trolley boards extend the full length of the car, with a space of one inch between the roof and the boards. Cherry constitutes the interior finish, with the varnish rubbed to a dull gloss. The partition between the compartments is of cherry, with a single sliding door having a 27-in. opening. The seats in the smoking compartment are longitudinal and made of cherry slats. The seats in the non-smoking compartment are the Brill "Winner" type with 18-in. backs and the cushions are 37 in. long, leaving the aisle 24½ in. wide.

The doors at the body ends of the prepayment cars are arranged to slide together into a central bulkhead. The exit door is arranged for operation by a lever convenient to the conductor's position. The exit door of the vestibule is located next to the vestibule corner post and arranged to slide outside of the paneling. This door is operated by a long upright lever connected with a pedal device convenient to the motor-man's position. The folding doors on the opposite side of the vestibule are made in two sections, hinged to the vestibule corner post. Substantial catches at top and bottom hold the doors securely while open and are conveniently unfastened. A pipe stanchion separates the entrance and exit passages at this side of the platform, and, besides serving as a grab han-



LARGE SEMI-CONVERTIBLE CARS FOR WILKES-BARRE, PA. Six cars of the same general type as the one shown on the preceding page, but without prepayment platforms, were furnished for service on a 12-mile division of the system



LARGE SEMI-CONVERTIBLE CARS FOR WILKES-BARRE, PA. The interior of both types of cars is the same. The seats in the smoking compartment are placed longitudinally

dle, provides substantial support to the central part of the folding doors, preventing their being forced outward. The pipe railing which divides the platforms into entrance and exit passages is arranged to slide on uprights and held by strong catches under the roof of the hood when not in use. The vestibule windows are each fitted with two sashes, the bottom sash being stationary and the top sash designed to slide down to the level of the bottom sash. Under the windows the sheathing consists of tongue-and-groove boards, with bumper shields set at an angle of 45 degrees, and made in two pieces having an invisible joint at the center, and bolted to the vestibule.

The platforms of the non-prepayment cars are about a foot shorter and have a novel arrangement of double doors in

the fact that the section of the door hinged to the vestibule corner post is much narrower than the section hinged to the body corner post. The purpose of the arrangement is obvious, the larger section of the door being used for exit; also the narrower door obstructs less of the vestibule window.

The electrical equipment was furnished and installed by the carbuilder and includes cables in semi-conduits and all the appurtenances for mutiple-unit control. The lighting circuit



LARGE SEMI-CONVERTIBLE CARS FOR WILKES-BARRE, PA. The principal members of the underframe are composed of 18-in. by $\frac{1}{4}$ -in. steel plates reinforced at the top with 3-in. by $\frac{1}{2}$ -in. steel bars and at bottom with $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $\frac{3}{8}$ -in. angles. This steel underframe was designed for the Brill Semi-Convertible car and is now specified for most cars of this type

includes illumination for Hunter signs at each end of the car.

The bottom framing is composed of 18-in. by $\frac{1}{4}$ -in. steel plates, reinforced at the top with 3-in. by $\frac{1}{2}$ -in. steel bars and at the bottom by $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $\frac{3}{8}$ -in. angles. The crossings are made in the form of an open truss with a top chord of 4-in. channel and the bottom of 4-in. by $\frac{3}{8}$ -in. steel plate, dropped at the center to pass underneath the center stringers.

The Wilkes-Barre Railway Company's system comprises 90 miles of standard-gage track with nearly 100 passenger

cars in normal operation. The entire passenger equipment is 185, all of which are motor cars, and about 10 additional service cars, 6 of which are snow plows and sweepers. Outside of the city of Wilkes-Barre a considerable proportion of the lines are operated on private right-of-way at a speed of 25 to 30 miles per hour. Although the lines traverse a hilly country, the grades are not severe. The 6 larger cars shown on page 332 are for operation on the Harvey's Lake division, where there is a steady climb of about 12 miles. This lake is the largest body of fresh water in the state and is 90 miles in circumference. The altitude is 1450 ft., while at the central part of the city the altitude is 550 ft. The population tributary to the lines is nearly 300,000.

The principal dimensions, etc., of the 14 pay-as-you-enter cars are as follows:

Length of body	34 ft. 0 in.	From platform to floor	9½ in.
Length over platforms	46 ft. 0 in.	Seating capacity	46
Length of platforms	6 ft. 0 in.	Type of trucks	Brill No. 27-M.C.B.1
Length of passenger comp.	25 ft. 0 in.	Wheel base	6 ft. 3 in.
Length of smoking comp.	9 ft. 0 in.	Diameter of wheels	34 in.
Centers of side posts	2 ft. 8 in.	Size of journal	4¼-in. by 8 in.
Width over sills	8 ft. 3¼ in.	Type of motors	West. 101-B2—4-40 h.p.
Width over posts	8 ft. 6 in.	Wt. of car body including electrical and air brake equipments	22,260 lbs.
Extreme width	8 ft. 9½ in.	Wt. of trucks	17,040 lbs.
From track to sills	2 ft. 10⅞ in.	Wt. of motors	11,120 lbs.
From sills over trolley boards	8 ft. 7¼ in.	Total weight	50,420 lbs.
From floor to headlining	7 ft. 5⅜ in.		
From track to step	17⅞ in.		
From step to platform	15½ in.		

The principal dimensions, etc., of the 6 straight-sided cars are as follows:

Length of body	37 ft. 5 in.	From platform to floor	9½ in.
Length over platforms	47 ft. 2 in.	Seating capacity	52
Length of platforms	4 ft. 10½ in.	Type of trucks	Brill No. 27-M.C.B.1
Length of passenger comp't	28 ft. 0½ in.	Wheel base	6 ft. 3 in.
Length of smoking comp't	9 ft. 4½ in.	Diameter of wheels	34 in.
Centers of side posts	2 ft. 8 in.	Size of journal	4¼-in. by 8 in.
Width over sills	8 ft. 6 in.	Type of motors	West. 305—4-75 h.p.
Width over posts	8 ft. 6 in.	Wt. of car body including electrical and air brake equipments	23,620 lbs.
Extreme width	8 ft. 9½ in.	Wt. of trucks	16,980 lbs.
From track to sills	2 ft. 10⅞ in.	Wt. of motors	14,200 lbs.
From sills over trolley boards	8 ft. 7¼ in.	Total weight	54,800 lbs.
From floor to headlining	7 ft. 5⅜ in.		
From track to step	17½ in.		
From step to platform	15⅞ in.		

NEW ORDER GUIDE FOR TRUCK PARTS

A NEW publication, recently sent to users of Brill trucks, simplifies ordering of repair parts by showing the individual parts and giving a figure number, name and description to each part. The book, which is 6 in. by 9 in. and contains 72 pages, shows each of the eight principal Brill



The new Brill Order Guide for truck parts contains 72 pages and illustrates 713 individual parts of eight Brill Trucks

types, first with an engraving of the complete truck, followed by an engraving of the truck with wheels and axles removed and each part numbered and named; the succeeding pages applying to the type are illustrated with the individual parts and descriptions, as shown in the above photograph. Requests for copies should be addressed to the Publicity Department, The J. G. Brill Company, Philadelphia.

THE J. G. BRILL COMPANY

Main Office : PHILADELPHIA, U. S. A.

Cable Address : "BRILL," Philadelphia

London Office : 110 Cannon Street, E. C.

Cable Address : "AXLES," London

American
Car Company
St. Louis, Mo.

G. C. Kuhlman
Car Company
Cleveland, Ohio

John Stephenson Company

Elizabeth, N. J.

Wason
Manufacturing Company
Springfield, Mass.

Danville
Car Company
Danville, Ill.

COMPAGNIE J. G. BRILL

49 Rue des Mathurins, Paris

Cable Address : "BOGIBRIL"

AGENCIES

Pacific Coast

Pierson, Roeding & Co.
118 New Montgomery St.
San Francisco

Argentine and Uruguay

Federico H. Bagge
Calle San Martin 201
Buenos Aires

Australasia

Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Natal, Transvaal and Orange River Colony

Thomas Barlow & Sons
Durban, Natal

Belgium and Holland

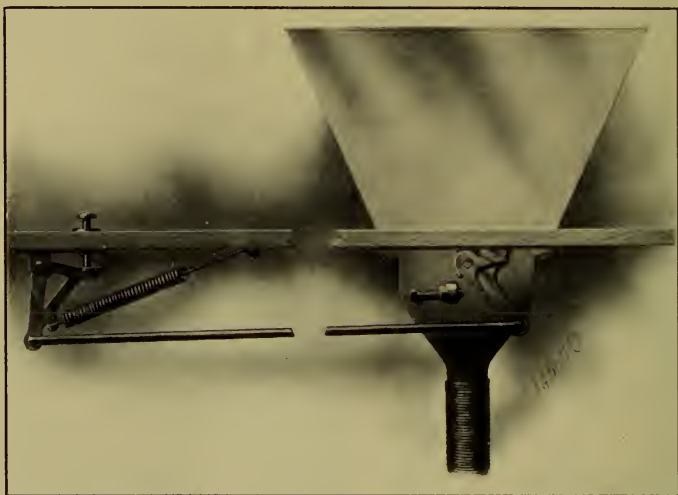
C. Dubbelman
45 Rue de la Caserne
Brussels

China

Shewan, Tomes & Co.
Hong Kong, Canton
Shanghai

Italy

Giovanni Checchetti, Piazza Sicilia, 1, Milan



BRILL "DUMPIT" SAND BOX

This sand box has won its way into general use in the nine years since its introduction and has never shown the need of improvement in any part. It has four special features—no moisture can possibly reach the box through the hose; the flow is continuous; the operation is easy and positive; the construction is simple, strong and compact. When ordering please say where the boxes are to be located and give the dimensions of the space available for the hopper; say whether the hopper is to have the valve in the center, as in the illustration, or at the end to clear the bottom framing (5-in. by 8-in. opening in the floor is required for the valve); also give distance from base of hopper (usually floor) to rail head, approximate length of operating rod and say whether operation by foot pedal or hand lever is desired.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



Main Street
Dallas, Texas



BRILL PORTABLE VESTIBULE

Where closed or open-sided vestibules are not used, this portable vestibule will be found a valuable accessory, increasing the efficiency of the motorman by protecting him from storm and wind, shielding passengers entering or leaving the car, and aiding to keep the car warm in winter by reducing the draughts when the doors are open. It is substantially though lightly constructed, bears directly on the dasher railing, is held upright by straps around the hood supports, and is connected with the hood by a narrow canvas bellows. The central sash is arranged to slide to one side; the side sashes are stationary.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



W. B. Strickland

PRESIDENT OF THE TEXAS TRACTION COMPANY

BRILL MAGAZINE

Vol. V

DECEMBER, 1911

No. 12

J. F. STRICKLAND

[WITH PORTRAIT INSERT]

J F. STRICKLAND, President of the Texas Traction Company and other electric railway and gas properties in Texas, was born in the hill country of northern Alabama in 1860. His first connection with public utilities was in 1892, when he engaged in the electric light business at Waxahachie, Tex. Ten years later he merged this property with the electric lighting interests in the neighboring city of Hillsboro, after which the following properties were acquired in succession: the electric light and gas of Clebourne, the electric light and water of Dublin, the electric light of Bonham, and the electric light of Sherman. The J. F. Strickland Company was formed in 1908 for the management of these properties. About the time of the formation of the company, Mr. Strickland conceived the idea of connecting the cities in the north central part of the State with an interurban system, and first developed the line from Dallas to Sherman, a distance of about 60 miles, which was put in operation on July 1st, 1909, and a year later the local lines at Denison and Sherman and the 10½-mile line connecting the two cities were brought under the same management. Last June Mr. Strickland and associates purchased the electric light, gas and street railway systems of Waco. Recently Mr. Strickland has been developing a line extending southward from Dallas through the cities of Ferris, Waxahachie, Hillsboro, and Italy, terminating at Waco, a distance of 100 miles, and having a line diverging at Ferris and running in a southeasterly direction through Ennis to Corsicana, in the heart of the central Texas oil fields and a distance of about 35 miles from Dallas. Mr. Strickland was one of the organizers of the Southwestern Electric and Gas Association and was its president to the year 1900, and again in 1904, when the Southwestern Gas and Electrical Association and the Southwestern Street Railway Association were consolidated.

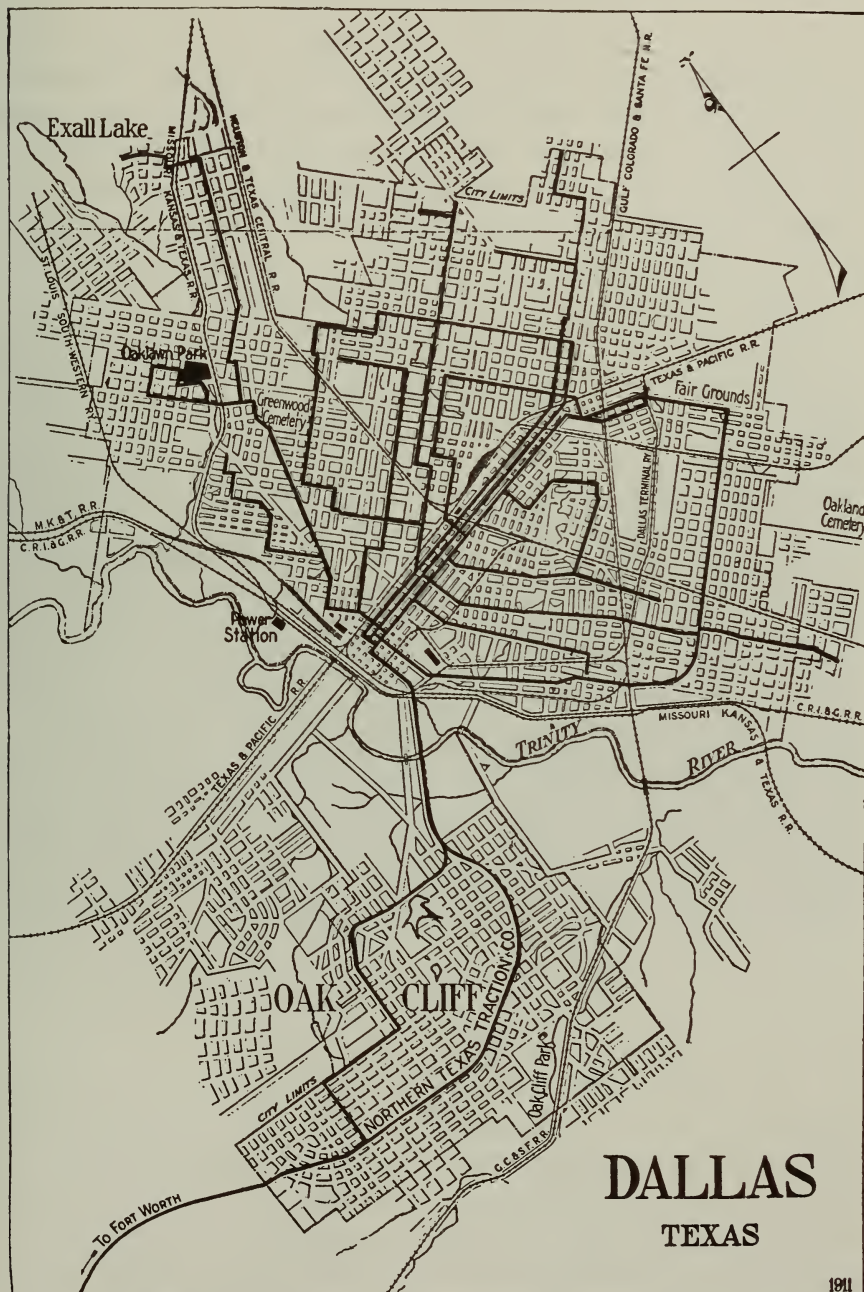
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

DALLAS, TEXAS *

DALLAS, a city of 100,000 people, is at the population center of Texas. A circle of 100 miles radius drawn about Dallas as a center would include one-third of the population of the State of Texas, although containing but 10 per cent. of the total area of 274,000 square miles. The territory described by this circle represents 34.2 per cent. of the assessed valuation of the State and 30 per cent. of the railroad mileage. In addition to being the largest inland cotton market in the world, Dallas also leads the world in the manufacture of saddlery and cotton gin machinery. The city is the jobbing center of the Southwest, the value of this business alone for 1910 amounting to \$130,000,000, an increase of \$20,000,000 over 1909. A steady as well as rapid development is also shown along all lines of manufacture.

The city has 650 acres of parks, including Fair Park, with an area of 127 acres, used as a public recreation ground for the entire year with the exception of thirty days allotted to the Fair Association, during which time the State Fair of Texas is held here. The fair lasts two weeks, and is conceded to be the largest institution of its kind in the country, the attendance for 1911 aggregating 833,000, the maximum attendance for one day being 128,000. Fair Park is reached by two of the street railway lines of the local company, having an extensive track layout at the grounds, to facilitate handling the large crowds which annually attend. On the day of maximum attendance, mentioned above, 66 extra cars were operated on the Fair Park line, the headway being slightly less than one minute.

* The thirty-sixth article of this series.



In view of the above facts and figures, it is natural that Dallas should be the traffic center of the Southwest. The city is served by nine trunk line steam roads and two high-speed interurbans also connect the city with the cities and towns to the north and west. A third interurban is now being constructed by Stone & Webster, which will extend thirty miles



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Commerce Street, looking west from St. Paul Street. The population of Dallas has more than doubled in 10 years

south to Waxahachie, opening up an exceedingly fertile and prosperous farming country, and furnishing cheap transportation to the Dallas markets.

The street railway and lighting properties of the city of Dallas are under the general management of the Stone & Webster Management Association. The total trackage, including the Oak Cliff line of the Northern Texas Traction Company, also a Stone & Webster property and operated in connection with the interurban line connecting Dallas and Fort Worth, is approximately 75 miles. The mileage of the

subsidiary companies of the Dallas Electric Corporation, with which this article deals, is 61. These lines serve a population of about 85,000.

Generally speaking, the city of Dallas is level and presents few physical difficulties of operation from this standpoint. The greatest problem with which the present management



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Elm Street, looking east from Murphy Street. Main Street, which is shown on the cover, Commerce Street on the opposite page, and Elm Street, are one block apart and are the three main arteries of travel

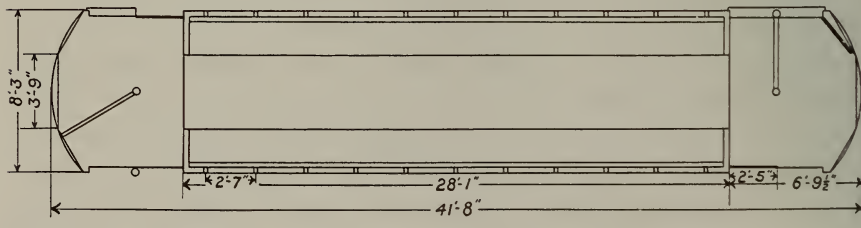
has had to contend is the phenomenal growth of the city. In 1902, when Stone & Webster took over the property, the city had a population of 45,000, while the present population closely approximates 100,000. At the time the city lines came under their present management the roadway was of decidedly light construction, suitable only for the lightest type of single-truck cars, which were operated at that time. An extensive rehabilitation was imperative and this work has been going on during the entire period up to and including



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Standard longitudinal-seat car on Brill No. 27-G1 trucks. This truck is the standard type of the Dallas lines

the present time. The work has been done in all cases according to the very best engineering standards. The track has been laid on a six-inch concrete foundation, with rails varying in weight from $77\frac{1}{2}$ to 103 pounds per yard, depending, of course, upon service conditions. Until recently girder rail was used exclusively in paved streets, but at present a high tee rail with block headers is giving excellent satisfaction.

The company owns 168 passenger cars, as follows: 55 open, 99 closed and 14 semi-convertible cars. At present the company is operating 60 regular 18-hour cars with 40 extras during rush hours. Of the 60 regular cars 43 are of the prepayment



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Floor plan of the car illustrated above. The platform railing is swung around to provide more space on front platform for standing passengers and prevent crowding against the motorman

type, and the company owns in all about 65 cars arranged for pay-as-you-enter operation. During 1910 the local lines carried 18,465,200 fare passengers and 4,144,600 transfer and free passengers, a total of 22,609,800 passengers. The passenger mileage for the year was 3,249,000, operated in 433,770 car hours. All city lines are operated with a universal transfer system, permitting a maximum ride of a trifle over 16 miles. The business section of the city has three main arteries of travel—Commerce, Main and Elm Streets—all of which are shown in the accompanying photographs. These streets are one block apart and run east and west. So far as possible, the routing of cars has been carried out with the idea of dividing



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. These cars are of semi-steel construction and have the single drop-sash window arrangement. Seating capacity, 40



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Standard cross-seat car of the Brill semi-convertible type and with pay-as-you-enter platforms. The extended appearance of the upper part of the car is due to photographic distortion



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Longitudinal corner seats occupy the space of three windows each. Seating capacity, 40

the traffic proportionally between these thoroughfares, thus relieving congestion at any particular point. All lines, with one exception, come into a central loop. As the line noted above as the exception runs within a block of this loop, it is possible, with a maximum walk of only one block, to get a car for any section of the city. The loop is at the extreme west end of the business center, and the congestion which ordinarily results from a central loop of this kind at the heart of the business district is thereby avoided to a large extent, although the loop is situated within a block of three of the passenger stations of the trunk line steam roads. The track arrangement at the loop is such that during rush hours extra cars can be turned back without making the circle of the loop. This, of course, expedites the handling of the morning and evening crowds.

The chief consideration determining the type of car for local city service is in the fact that the residence sections are a comparatively long distance from its business activities and results in a large amount of long haul traffic. For this class of business double-truck cars with longitudinal seats, as a rule, are used, these cars being of the prepayment type. While the company uses several types of these cars, varying in minor details, the dimensions of the substantially standard car having longitudinal seats are 28 ft. 1 in. over the body, 41 ft. 8 in. over the platforms, and a width over all of 8 ft. 6½ in. The prepayment cars of the cross-seat type have about the same dimensions. Both types of cars seat 40 passengers and both are mounted on Brill No. 27-G1 trucks.

The outward appearance of ten 26-ft. cars now on order will be very similar to the accompanying photograph of the longitudinal-seat prepayment car. The bodies will be mounted on Brill trucks equipped with two commutating pole motors, type GE-219, Form B-1, rated at 50 h.p. each at 600 volts.

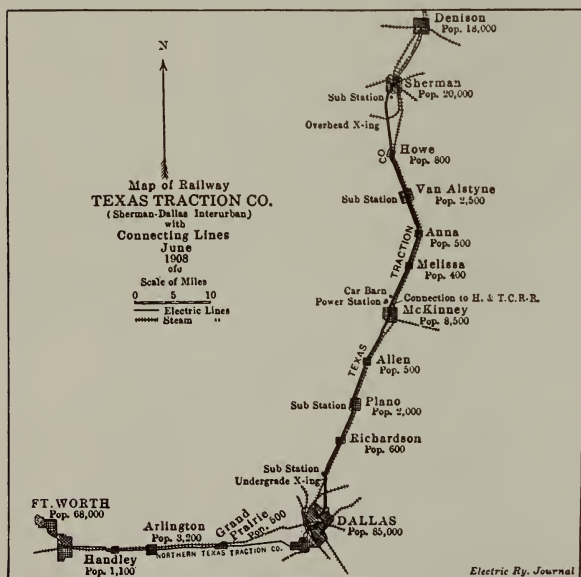
We are indebted to Mr. Edward T. Moore, local manager of the Dallas Electric Corporation, for the foregoing article.

CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY

SEMI-STEEL CONSTRUCTION

THE Texas Traction Company received, about the first of November, three interurban cars, two double-truck trailer cars and two single-truck motor cars, built by the American Car Company. The cars are all of semi-steel construction and have plain arch roofs, and, as the photographs show, are thoroughly modern in character and equipment. The interurban cars are for service between Dallas and Sherman and are mounted on trucks of the Brill No. 27-M.C.B. 3 type, capable of a speed of 65 miles an hour.

The interurban system of the Texas Traction Company is the longest in Texas, and extends from Dallas to Sherman, a



Reproduced from the Electric Railway Journal of August 1st, 1908.

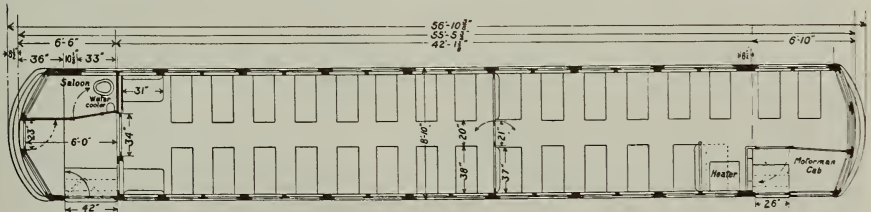
CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. The population of the cities and towns on these railway systems has increased about 20% since the map was published

distance of over 60 miles, and by its connections with the Northern Texas Traction Company at Dallas and the Denison & Sherman Railway at Sherman, affords opportunity for a through electric railway trip of over 100 miles. With the exception of the lines through the streets of the



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. One of three semi-steel interurban cars built by the American Car Company. Mounted on Brill No. 27-M.C.B.3 trucks

cities and towns on the route, the road is built on private right-of-way. The line is generally parallel to the Houston & Texas Central Railroad and traverses a fertile section known as the Black Belt, so named from the rich color of the soil, and is one of the most populous and prosperous regions in the State. The system presents a good example of the latest type of direct-current interurban railway and is capable of operation on fast schedules because of the substantial equipment, track and roadbed. The grades are few and generally within 1.5 per cent. Although the cars are equipped for double-end operation, they are generally run as single-end, as both the terminals and the car-house tracks provide Y's.



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. The cars are arranged for operation at either end, but are normally operated at one end, as the motorman's cab indicates. Seating capacity, 62

The floor plan of the new cars on page 347 shows that the operation is from one end and that this end is completely enclosed, while the rear end has a door at the center to permit passage between cars. While the cars are intended for operation at one end, they are equipped with controllers, etc., at the rear and have pilots at both ends, and the seats have reversible backs.

The bottom framing consists of four 6-in. I-beam center sills extending from bumper to bumper and having yellow pine fillers; also side sills of yellow pine with 18-in. by $\frac{3}{8}$ -in. plate on the inside and a Z-bar riveted at the bottom. The center crossings are of white oak and the bolsters are of 10-in. by 1-in. steel plates, bolted through the longitudinal timbers, I-beams and channels. Undertrusses of 1 $\frac{1}{4}$ -in. diameter are



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. Golden quartered oak constitutes the interior finish of these handsome cars

brought under queen posts which extend from double-trussed needle beams. The ends of the car are reinforced by inside trusses of 3-in. by $\frac{1}{2}$ -in. steel supported over the bolsters on malleable iron struts.

The flooring is laid in two thicknesses, with felt between. The bottom flooring is tongue-and-groove yellow pine, laid crosswise, and the top flooring is of tongue-and-groove hard maple, laid

longitudinally and made impervious to water by a thorough slushing with boiled linseed oil and a covering of four coats of mineral floor paint. The rear end of the cars is framed for a 34-in. opening for a single sliding door. The partition between the compartments is for a 20-in. double-acting swing door, and the swing door at the center of the vestibule is 23 in. wide. In the window arrangement the upper sashes are stationary and the lower sashes raise 26 in.; at the front end the sashes are arranged the same as the side windows, except in the motorman's cab, which has a drop-sash. The roof is provided with 18 Garland ventilators, and ventilators are provided in the toilet compartment, the rear



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. The cars are modernly equipped in every particular to adapt them to the class of service demanded on this progressive system



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. Semi-steel trailer cars for use on the local lines of the system. Mounted on Brill No. 57 trailer-trucks

platform and the motorman's cab. Golden quartered oak of selected stock constitutes the interior finish, including window sashes, doors and partitions. No curved mouldings, rosettes



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. The bright and attractive appearance is due to the extra high windows possible with the Brill Plain Arch roof. Seating capacity, 40

or other ornamentation which might afford lodgment for dust and dirt are permitted in the interior woodwork. The ceilings are composed of a fiber composition, tinted light green and plainly striped in gold leaf.

Seats of the Brill "Winner" type, with high backs and head rolls, leather upholstered, have the following dimensions: Length over arm rest, 38 in.; width of cushion, 18 in.; height from floor to top of back, 41 in. The seats are spaced 33 in. from center to center, and the width of the aisle is



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. Semi-steel motor car mounted on Brill No. 21-E truck. Note the curved steel side panels of this car and car shown on opposite page

20 in. The heating is furnished from a forced-ventilation system of the Peter Smith type, the heater being placed in the smoking compartment behind the motorman's cab and arranged to be removed in the summer and a seat substituted.

The trail cars and the single-truck motor cars have an unusual feature, consisting of steel side sheathing convex in the upper part and concave in the lower and omitting the guard-rail. The interiors are plainly finished and the windows have drop-sashes in the lower part and stationary in the upper. The single-truck motor cars are of the prepayment type and have mutually-operating folding door and step device. The platform railing is equipped with a Brill No. 4-A



CITY AND INTERURBAN TYPES FOR THE TEXAS TRACTION COMPANY. The platforms are arranged for prepayment fare collection. The seats are of the Brill "Winner" type. The lower window sashes drop into pockets in the side walls and the upper sashes are stationary

portable fare box furnished with a totalizer. This fare box cannot be taken from the railing without first pulling back the handle which insures getting the last fares into the box, and turning the box upside down automatically locks the cover.

The principal dimensions of the interurban cars follow:

Length of body	42 ft. 1 $\frac{3}{8}$ in.	From track to step	17 in.
Length over platforms	56 ft. 10 $\frac{3}{8}$ in.	From first step to platform	2 ft. 10 in.
Length of front platform	6 ft. 10 in.	Seating capacity	62
Length of rear platform	6 ft. 6 in.	Type of trucks	Brill No. 27-M.C.B.3
Length of general comp.	24 ft. 9 in.	Truck wheel base	6 ft. 6 in.
Length of smoking comp.	24 ft. 1 in.	Diameter of wheels	37 in.
Centers of side posts	2 ft. 9 in.	Size of journal	5 in. by 9 in.
Width over sides	8 ft. 10 in.	Type of motors	G.E.-73-4-75 h.p.
Extreme width	9 ft. 0 in.	Wt. of car body less elec. equip.	37,000 lbs.
From track to side sills	3 ft. 7 $\frac{3}{8}$ in.	Wt. of trucks	33,520 lbs.
From side sills over trolley boards	9 ft. 8 $\frac{5}{8}$ in.	Wt. of motors	14,660 lbs.
From floor to headlining	8 ft. 6 in.		

The principal dimensions of the trailer cars are as follows:

Length of body	28 ft. 0 in.	From floor to headlining	7 ft. 3 $\frac{5}{8}$ in.
Length over platforms	38 ft. 0 in.	From track to step	16 $\frac{3}{4}$ in.
Length of platforms	5 ft. 0 in.	From step to platform	14 $\frac{1}{8}$ in.
Centers of side posts	2 ft. 8 in.	From platform to floor	9 $\frac{5}{8}$ in.
Width over sills	7 ft. 9 $\frac{1}{2}$ in.	Seating capacity	40
Width over posts	8 ft. 2 in.	Type of trucks	Brill No. 57 Trailer
Extreme width	8 ft. 5 in.	Wheel base	4 ft. 6 in.
From track to side sills	2 ft. 9 $\frac{7}{8}$ in.	Diameter of wheels	34 in.
From side sills over trolley boards	8 ft. 3 $\frac{5}{8}$ in.	Wt. of car body less elec. equipment	17,000 lbs.

The principal dimensions of the single-truck motor cars are as follows:

Length of body	20 ft. 8 in.	From track to step	14 $\frac{7}{8}$ in.
Length over platforms	31 ft. 8 in.	From step to platform	12 in.
Length of platforms	5 ft. 6 in.	From platform to floor	7 $\frac{1}{8}$ in.
Centers of side posts	2 ft. 5 in.	Seating capacity	32
Width over sills	7 ft. 9 $\frac{1}{2}$ in.	Type of trucks	Brill 21-E.
Width over posts	8 ft. 2 in.	Wheel base	8 ft. 0 in.
Extreme width	8 ft. 5 in.	Diameter of wheels	33 in.
From track to side sills	2 ft. 2 $\frac{5}{8}$ in.	Type of motors	G.E.-88
Side sills over trolley boards	8 ft. 3 $\frac{5}{8}$ in.	Wt. of car body less elec. equipment	12,000 lbs.
From floor to headlining	7 ft. 3 $\frac{1}{2}$ in.		



LIGHT-WEIGHT CARS FOR MUSKOGEE, OKLA.

PREPAYMENT TYPE

TEN cars of the type illustrated, shipped on November 15th by the American Car Company to the Muskogee Electric Traction Company, are among the most interesting cars ever built, the most interesting feature perhaps being the remarkable light weight—7000 lbs. for the car body. While the use of the Brill plain arch roof and the omission of bulkheads and drop-platforms are the chief factors in the reduction of weight, every part of the car and its equipment



LIGHT-WEIGHT CARS FOR MUSKOGEE, OKLA. These car bodies weigh 7000 lbs.—probably the lightest-weight closed car of their length ever built. Mounted on Brill No. 21-E trucks

was carefully studied to economize the weight by reducing the material to the utmost extent consistent with durability under the service conditions of the lines. The selection of material and its disposition, together with the general structural design, was given minute investigation and the stresses and vibrations were fully considered in conjunction with the maximum load, and the result is particularly interesting at this time when the question of weight is receiving attention and study from every quarter.

The sides of the car are framed with ash posts which are only $1\frac{1}{2}$ in. thick. Compensation is given for this light construction by making the top and bottom rails of the upper sashes in single pieces, thus forming a firm bracing for the posts and stiffening them in a manner which allows no more spring than if they were twice as thick and supported in the usual way. All longitudinal members extend from corner post to corner post, with the exception of the top and bottom rails of the lower sashes, which sashes are arranged to raise 26 inches. Galco board, weighing 1 lb. to every 93.4 square inches, is used for the outside panels; no inside panels are used nor are there any concave rails or stringers, as the Galco is sufficiently strong to serve in their stead. Inside truss rods

are concealed under the arm rail and the ends are anchored under the side sills well beyond the corner posts. The ends of the car are further supported by truss pipes, extending from the trucks. Much weight has been saved by omitting dropped platforms, which not only are heavy in themselves but require a heavy construction of the bottom framing for their support and to resist the leverage of the load.

The cars are built on an underframe composed entirely of wood, long-leaf yellow pine, $3\frac{1}{2}$ in. by $7\frac{3}{4}$ in., being used for the side sills and the end sills and center cross joists of $2\frac{1}{2}$ -in. by $4\frac{1}{16}$ -in. white oak. The crossings are not only mortised into the side sills but are secured by a light forged pocket by which they are bolted to the underside of the sills. No sub-sills are used, but instead forged angle brackets located between each crossing are bolted to the sills, and these brackets and the



LIGHT-WEIGHT CARS FOR MUSKOGEE, OKLA. The light weight was largely secured by the omission of drop platforms, bulkheads and monitor deck. Seating capacity, 32

pockets at the ends of the crossings rest directly on the top chord of the truck.

The roof construction is correspondingly light and consists of wooden rafters made of two strips, tongued and grooved together, glued and bent into shape and the roof boards glued and nailed to each rafter. The ceilings are composed of $\frac{1}{8}$ -in. Galco and extend from vestibule bow to vestibule bow and bent to the contour of the hoods; the hoods are not detachable and the entire roof is covered with a single piece of canvas. The doors are a little less than $\frac{3}{4}$ -in. thick and the sashes slightly more than $\frac{1}{2}$ -in. thick.

Below the end windows sheet steel is used for sheathing, and paneling on the inside is omitted. The side and end windows have stationary upper sashes and the lower sashes are arranged to raise. Between the sub-posts and corner posts at each corner of the car is a narrow hinged sash for ventilation purposes.

At the entrance side of the platform there is a pipe railing which extends from a central wooden upright to which the entrance and exit doors are hinged; these doors are operated by levers from the conductor's position and fold back against the railing. The forward exit door slides from the body corner post toward the vestibule corner post and is operated by a lever from the motorman's position. Six Brill "Winner" seats, weighing 62 lbs. each and having spring cane cushions and ash spindle backs, are on each side of the aisle and together with longitudinal corner seats, which occupy the space of one window each, give a total seating capacity of 32. Push buttons are provided on each post and the cars are equipped with sand boxes, gongs, signal bells, draw-bars and other patented specialties of Brill manufacture. The cars are all mounted on Brill No. 21-E trucks.

The Muskogee Electric Traction Company operates about 20 miles of track in Muskogee and vicinity. The climate in this region is mild, with long summers having a bountiful rain-

fall, and short winters with little snow. The city, which has a population of over 25,000, is in the eastern part of Oklahoma and is one of the principal railway centers in that section of the country.

The principal dimensions of the cars are as follows:

Length over corner posts . . . 21 ft.	3 in.	Seating capacity	32
Length over end sheathing . . . 31 ft.	3 in.	Type of trucks	Brill No. 21-E
Length over bumpers 32 ft.	3 in.	Wheel base	8 ft. 0 in.
Width over sills including panels	7 ft. 6 in.	Diameter of wheels	30 in.
Width over posts at belt	7 ft. 11 in.	Motors	G.E.-54—2-25 h. p.



MORE SEMI-CONVERTIBLE CARS FOR WACO, TEX.

ONE-MAN OPERATION

THE Citizens' Railway Company of Waco was recently purchased by Mr. J. F. Strickland and associates of Dallas, and the name was changed to the Waco Street Railway Company. The rolling stock of twenty passenger



MORE SEMI-CONVERTIBLE CARS FOR WACO, TEX. By locking the rear doors, folding the steps and using a fare box on the front platform, the cars are operated by one man

cars has been augmented by five cars of the type illustrated, recently furnished by the Danville Car Company. These cars are similar in most respects to those which were supplied by the same builder last year and which were described in the *BRILL MAGAZINE*, issue of October, 1910. The cars of the last shipment have four transverse seats to each side and longitudinal corner seats accommodating four passengers



MORE SEMI-CONVERTIBLE CARS FOR WACO, TEX. Panoramic view, showing Austin Street, the principal business thoroughfare. The 22-story building is in the heart of the business district

each. The platforms are 5 ft. 6 in. long. By locking the rear doors, folding the steps and using a fare box on the front platform, the cars are operated by one man. This plan has been in operation for over a year and has effected considerable saving and, at the same time, has proved popular with the patrons of the road. Wire window guards and bumper shields are used to prevent persons gaining access to the car through the rear vestibule windows.

The city of Waco has a population of 35,000 and is the center of the Brazos Valley cotton district, which produces the finest grade of staple cotton in the country. The city lies on

both sides of the Brazos River and is connected by suspension bridges, one of which is used for the tracks of the electric railway system, as well as for vehicles and pedestrians. The lines are mostly single-track and extend in all directions from the business center, returning on parallel streets. Throughout the day the traffic is fairly even, with the increase in the morning and evening taken care of by trailers and trippers.



MORE SEMI-CONVERTIBLE CARS FOR WACO, TEX. A continuation of the panorama, looking out Eighth Street. The Masonic Temple is shown at the right

The principal dimensions and weights of the cars follow:

Length of body	20 ft. 8 in.	From platform to floor	7 $\frac{1}{2}$ in.
Length over platforms	31 ft. 8 in.	Seating capacity	32
Length of platforms	5 ft. 6 in.	Type of trucks	Brill No. 21-E
Centers of side posts	2 ft. 5 in.	Wheel base	8 ft. 0 in.
Width over sills	7 ft. 9 $\frac{1}{2}$ in.	Diameter of wheels	33 in.
Width over posts	8 ft. 2 in.	Size of journal	3 $\frac{1}{4}$ -in. by 7 $\frac{1}{2}$ in.
Extreme width	8 ft. 5 $\frac{5}{8}$ in.	Type of motors	G.E. 78A2-2
From track to side sills	2 ft. 2 $\frac{3}{8}$ in.	Weight of car body	12,820 lbs.
From side sills over trolley boards	9 ft. 6 $\frac{3}{8}$ in.	Wt. of electrical equipment	960 lbs.
From floor to headlining	8 ft. 6 $\frac{3}{8}$ in.	Weight of trucks	5,600 lbs.
From track to step	14 $\frac{7}{8}$ in.	Weight of motors	5,120 lbs.
From step to platform	12 in.	Total weight	24,500 lbs.

BRILL SEMI-CONVERTIBLE CARS FOR SAN ANTONIO, TEX.

PREPAYMENT PLATFORMS

THE San Antonio Traction Company put in operation last month 10 new cars built by the American Car Company. These cars are similar to 10 furnished last year and described in BRILL MAGAZINE of December, 1910. The Brill semi-convertible type of car, mounted on Brill No. 27-G1 trucks, was adopted by the San Antonio Traction Company in 1905, and both car and truck continue to be the standard of the system, 52 of these cars now being in operation. Nine-bench open cars, built by The J. G. Brill Company, mounted on Brill 21-E single-trucks, are also in operation, and before the introduction of the semi-convertible type constituted a large part of the equipment. The rolling stock totals about 165 cars and the trackage of the system comprises 65 miles.

The city of San Antonio is the largest in population in the State, having 96,614 in the 1910 census. It is situated in the southwestern part of Texas where the Guadalupe Mountains join the great Gulf Plateau and has a climate of such equable nature as to attract large numbers of visitors, who are



BRILL SEMI-CONVERTIBLE CARS FOR SAN ANTONIO, TEX. Standard Pay-As-You-Enter car of the San Antonio Traction Company, mounted on Brill No. 27-GE1 trucks

seeking health and recreation, to the splendid hotels and many persons derive benefit from the hot sulphur water which flows from deep artesian wells. Throughout the country San Antonio is known as a great tourist city, as it is one of the oldest cities in the United States and has much of historic interest. In addition to the natural beauty of its surroundings, the city



BRILL SEMI-CONVERTIBLE CARS FOR SAN ANTONIO, TEX. The platforms are 7 ft. long and have double two-leaf folding doors, operated by air in conjunction with the step from the stand at the center of the platform.

is one of the most attractive to be found in sub-tropical countries. Among its interesting characteristics is the cosmopolitanism of both its resident population and its large transient population. Commercially it is important as a live-stock, wool and cotton center and it is one of the principal railway centers of the State. One of the finest military posts in the United States is in the suburbs and is assuming greater importance yearly. The city railway system is comprehensive and furnishes a class of service which has been largely instrumental in developing the city and making it attractive as a home city for those occupied in business and other pursuits and for wealthy persons who come here from all parts of the State and make it their home for part of the year, and for its crowds of visitors. The commercial

district, with its morning and evening rush hour railway traffic and crowds attending theatres and other places of amusement, is furnished with an unusually efficient car service.

The new cars have the standard bottom framing of the type, including 15-in. by $\frac{3}{8}$ -in. steel plates on the inside of the



BRILL SEMI-CONVERTIBLE CARS FOR SAN ANTONIO, TEX. The mild climate of San Antonio permits the windows to be kept in the roof pockets during almost every day of the year and they are always available for the cool evenings. Seating capacity, 44

sills, which eliminates the necessity of inside and under-trusses, and the posts being secured to the plates adds to their security. The corner posts are $3\frac{5}{8}$ in. thick and the side posts $3\frac{1}{4}$ in. thick. The sides are straight and sheathed with No. 14 sheet steel. Steel rafters, $\frac{5}{8}$ in. thick, reinforce the roof and are placed to relieve the strain of the trolley apparatus to the best advantage. Five-bar window rods are used on each side of the cars and are of the folding type, made up of three sec-

tions to a side. Push buttons are furnished on each side post. The fenders are of the San Antonio type, substantially made of iron pipe and wire. Seats, sand boxes, platform gongs, signal bells, angle-iron bumpers and other specialties of Brill manufacture are used. During almost every day of the year the windows are raised entirely into the roof pockets but are always available for protection during cool evenings and on the few stormy days. The pay-as-you-enter platforms of these cars are arranged in a very interesting and practical manner, as the photograph of one of the platforms shows. The horizontal railing dividing the entrance and exit passages is curved in such a way as to give room for the conductor to stand in a position which does not interfere with outgoing passengers, and this rail is arranged to slide up out of the way on vertical pipes and be securely locked overhead. Double folding-doors of two-leaf type fold against the vestibule corner post and against the body end and are operated in conjunction with the folding-step by air from the conductor's position; the air valve is on the stand at the center of the platform and this stand also serves to support one of the pipes on which the horizontal rail slides. The front exit door and step also operate mutually and are controlled by the motorman. The cars are finished in cherry and have cherry slat seats of the "Winner" type with push-over backs.

Length of body	28 ft. 10 in.	Type of trucks	Brill 27-G1
Length over platforms	42 ft. 10 in.	Wheel base	4 ft. 6 in.
Length of platforms	7 ft. 0 in.	Diameter of wheels	33 in.
Centers of side posts	2 ft. 6 in.	Type of motors	West. 92A—4-35 h.p.
Width over sides	8 ft. 0 in.	Wt. of car body less electrical equipment	18,000 lbs.
Extreme width	8 ft. 2 in.	Wt. of electrical equipment (approx.)	8,500 lbs.
From track to side sills	2 ft. 8½ in.	Wt. of air brake equipment (approx.)	1,500 lbs.
From side sills over trolley boards	9 ft. 3¾ in.	Wt. of trucks (wt. of wheels about 3,000 lbs.)	11,200 lbs.
From floor to headlining	8 ft. 4⅞ in.	Wt. of motors	7,760 lbs.
Track to step	17⅞ in.	Total weight	46,960 lbs.
Step to platform	14 in.		
Platform to floor	8 in.		
Seating capacity			

SINGLE-TRUCK CARS FOR OKLAHOMA CITY, OKLA.

BRILL PLAIN ARCH ROOF

THE Oklahoma City Traction Company put in operation about the middle of October several new cars built by the American Car Company and mounted on Brill trucks of No. 21-E type. These cars are of light but substantial construction and are of standard design with the exception of a few details, which will be noted in the accompanying photographs.

The Oklahoma City Traction Company was incorporated in 1910 and purchased the plant formerly owned and operated by the Oklahoma Interurban Traction Company. Five miles of track are in operation and another five miles is under con-



SINGLE-TRUCK CARS FOR OKLAHOMA CITY, OKLA. The lower sashes drop into pockets having hinged covers, and the upper sashes are stationary



SINGLE-TRUCK CARS FOR OKLAHOMA CITY, OKLA. The exit doors at the forward end are fitted with step covers. Entrance is only permitted at the rear. The cars are mounted on Brill No. 21-E trucks

struction. The equipment consists of seven cars, five of which are closed, one is convertible, one open, and two work cars; all



SINGLE-TRUCK CARS FOR OKLAHOMA CITY, OKLA. Cars at Northeast City Park, a terminus of the system



SINGLE-TRACK CARS FOR OKLAHOMA CITY, OKLA. This photograph graphically shows the phenomenal development of Oklahoma City, which in 1900 had a population of 10,000 and in 1910, 65,000

of the cars were built by the American Car Company. It is said that the company has a valuable franchise covering all streets in Oklahoma City not occupied by other lines and apparently has a bright future and has planned a system comprising 60 miles of track. The phenomenal growth of Oklahoma City is well known throughout the country, as from a population of 10,000 in 1900 the census of 1910 placed the figure at 65,000.

The following are the general dimensions and weights:

Length of body	20 ft. 0 in.	Step to platform	12 3/4 in.
Length over platforms	29 ft. 5 in.	Platform to floor	6 1/8 in.
Length of platforms	4 ft. 8 1/2 in.	Seating capacity	28
Centers of side posts	2 ft. 9 13/16 in.	Type of trucks	Brill No. 21-E
Width over sills	6 ft. 3 in.	Wheel base	8 ft. 0 in.
Width over posts	7 ft. 5 1/2 in.	Diameter of wheels	33 in.
Extreme width	7 ft. 9 in.	Motors	2-35 h. p.
From track to side sills	2 ft. 2 5/8 in.	Weight of car body less elec. equipment	13,000 lbs.
From side sills over trolley boards	8 ft. 11 13/16 in.	Weight of truck	2,980 lbs.
From floor to headlining	7 ft. 9 1/4 in.	Weight of motors	4,530 lbs.
Track to step	15 3/16 in.		

INDEX TO BRILL MAGAZINE

Vol. V.
Jan.-Dec. 1911

Types of Electric Railway Cars

	Longitudinal Seat	Semi-Convertible	Prepayment	Open	Open Center Aisle	Open "Narrowgauge"	Comb'n Open & Closed	Double Deck	Trailer	Interurban Passenger	Comb'n Pass. & Baggage	Elevated	Parlor	Express & Freight	Construction & Coal	Plain Arch Roof	Steel Underframe
Asbury Park, N. J., Atl. Coast Elec. Ga.		15		209													
Athens, Ga.		204	204														
Beaumont, Tex.		82*	82*														
Benton Harbor-St. Joe Ry., Mich.		158															
Berlin, Germany		265									265			265			
Boise & Interurban Ry., Idaho	94			94													
Brooklyn Rapid Transit		2*															
Buenos Aires, Lacroze Tramways		119									119						
Carlisle, Pa., Cumberland Ry.		114															
Chattanooga, Tenn.		20*								11						11	11
Chicago & Joliet Elec. Ry.		149*															
Clinton, Iowa	22	22															
Coffeyville, Kan., Union Trac.																149*	
Columbus, Ohio																	
Concepcion, Chili	388	388	388					72*									
Dallas, Texas																	
Danbury & Bethel St. R. R., Conn.					81					42							42
Easton, Pa., Northampton Trac.																	
Emigration Cañon Ry., Utah									198							198	
Fairmont & Clarks'g Trac., W. Va.											146			77		77	
Fr'k'd, Tacony & Holmes'g Ry., Pa.	268	268															
Frederick R. R., Md.	119										119						
Great Falls St. Ry., Mont.	236																
Harrisburg, Central Penna. Trac.	187	187	187													187	187
Havana Central R. R., Cuba.	288																
Hummelst'n & Campbell't'n Ry., Pa.														206			
Illinois Trac. System	189*	189*									324	324				324	
Indianapolis, Crawfordville & West.									294	294							
Lake Charles, La.	117*																
Lancaster & York Furnace Ry., Pa.															258		
Lima, Peru	274	274*															
Liverpool Corporation Tramways								190*									
Los Angeles, Cal.								806									
Macon, Ga.		75	75													75	75
Madison, Wis.		79*															
Mexico Tramways	62	62															
Michigan United Rys.			100														
Missoula, Mont.															51		
Montreal St. Ry.		242															
Muskogee, Okla.		358*														358*	
Nahant & Lynn St. Ry., Mass.	224																
Norfolk City & Suburban Ry., Va.	299	299														299	
Norfolk & Portsmouth Trac., Va.	281	281														281	281
Norfolk & Southern R. R., Va.	200									200							
Oakland & Antioch Ry., Cal.															270	270	
Oklahoma City Trac., Okla.	364*															364*	
Omaha & Council Bluffs St. Ry., Neb.		44															
Ontario & San Antonio R. R., Cal.							112										
Parkers'g, Marietta & Int., W. Va.		296								296							
Phila. Rapid Transit											815				211	815	
Pittsburg Rys.	80	80							80							80	
Portland, Ore., United Rys. System										101	101						
Richmond & Henrico Ry., Va.		222	222														
San Francisco, United R. R.	126	126					126										
St. Joseph, Mo.										40							
St. Louis, United Rys.			214													214	
St. Louis Waterworks Ry.									48								
Saginaw-Bay City Ry., Mich.	321*	321*														321*	
San Antonio, Tex.		360	360														
San Juan, Porto Rico					141												
Selma, Ala.		108*	108*													108*	
Seranton & Binghamton Trac., Pa.		260								260							
Spokane, Wash.		184	184														
Stroudsb'g, Water Gap & Portland, Pa.					262											262	
Texas Traction Company			346*						346	346						346	
Vancouver, Brit. Columbia Elec. Ry.		184	184								227						
Waco, Tex.		357*	357*														
Washington Ry. & Elec., D.C.														17		17	
Wichita Falls, Tex.		151	151														
Wilkes-Barre, Pa.		331	331													331	331
Wilmington & Phila. Trac.		284														284	

* Single-truck Cars

INDEX—Continued

MISCELLANEOUS ARTICLES:

Exhibit at the A. E. R. A. Convention	281
History of The J. G. Brill Co. 25, 58, 90, 122, 153, 272, 302	
Manufacturer's Inspection and Test of Trucks	87
Nearside Car	165
New Order Guide for Truck Parts	336
Steel Underframes for City Cars	52
Test of Brill Half-Ball Brake Hanger by the Philadelphia Rapid Transit Company	85
Thesis Contest	301
Truck and Car Charts	84

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE:

Berlin	158
Buenos Aires	3
Brooklyn	94
Dallas	338
Lima	274
Liverpool	190
Los Angeles	306
Mexico City	62
Montreal	242
Pittsburgh	30
St. Louis	214
San Francisco	126

BIOGRAPHICAL:

Black, Charles N.	125
Blake, Henry W.	93
Brady, Arthur W.	1
Fell, A. L. C.	157
House, William A.	273
MacAfee, John B.	189
McCarter, Thomas N.	305
McLimont, Andrew W.	29
Ross, James	241
Sergeant, Charles S.	61
Strickland, J. F.	337
Whitridge, Frederick W.	213

TRUCKS:

No. 22 Special	115
27-M.C.B.3	230

MISCELLANEOUS EQUIPMENT:

Gas-Electric Cars, Steel	252
Sprinkling Car, Centrifugal	182

SUPPLEMENTS (Diagram Charts with Names of Parts):

Truck No. 39-E	March
" No. 22	April
" No. 27-F	May
" No. 27-M.C.B.	June
" No. 27-E	July
" No. 21-E	August
Sweeper, Long Broom	September
Truck No. 27-G	October
" No. 50-E	November
Car, Single Truck, Semi-convertible	December

ADVERTISEMENTS (facing or following the pages given):

Brake Hanger, Half Ball	29
Car, Convertible	198
" Funeral	93
Center Bearing, Oil-Retaining	156
Fare Box, No. 4	61
Gong, "Dedenda"	368
Locomotives, Heavy Electric	28
Omnibus Bodies	124
Plow, Snow	304
Sand Box, "Dumpit"	336
Seat, Motorman's	305
" "Winner"	1
Seating Material, Woven Cane	92
Springs	125
Sprinkling Car, Centrifugal	60
Sweeper, Long Broom	241
Track Scraper	273
Truck No. 21-E	240
" No. 27-F	213
" No. 27-M.C.B.	188
" No. 39-E	212
Underframe, Steel	157
Vestibule, Portable	337



THE J.G. BRILL COMPANY

MAIN OFFICE
PHILADELPHIA, U. S. A.
CABLE ADDRESS: "BRILL," PHILADELPHIA

LONDON OFFICE: 110 CANNON STREET, E.C.
CABLE ADDRESS "AXLES," LONDON

AMERICAN CAR COMPANY, ST. LOUIS, MO.
G.C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 RUE DES MATHURINS, PARIS
CABLE ADDRESS: "BOGIBRIL"

AGENCIES

PACIFIC COAST—Pierson, Roeding & Co., 118
New Montgomery Street, San Francisco; Los Angeles,
Seattle

AUSTRALASIA—Noyes Brothers, Melbourne, Sid-
ney, Dunedin, Brisbane, Perth

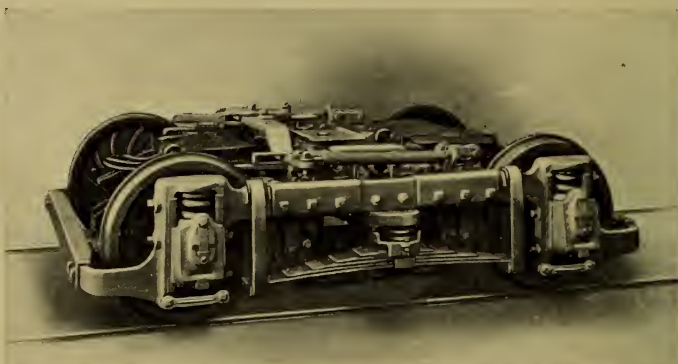
BELGIUM AND HOLLAND—C. Dubbelman, 48
Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—Shackleford &
Co., Calle Bartolome Mitre 478, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER
COLONY—Thomas Barlow & Sons, Durban, Natal

CHINA—Shewan, Tomes & Co., Hong Kong, Can-
ton, Shanghai

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

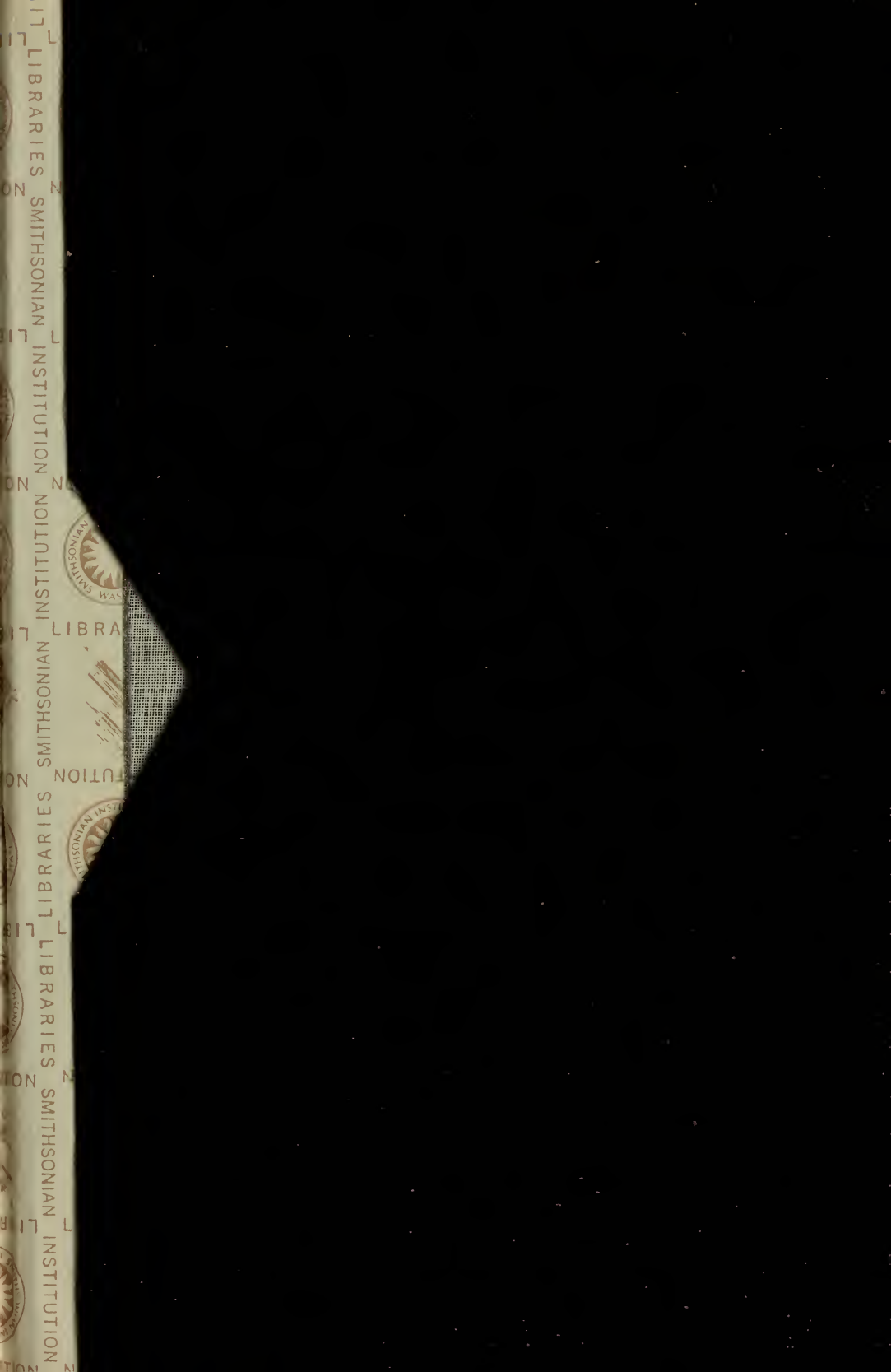


THE BRILL 77-E TRUCK

THIS truck is designed for 24-in. wheels and small inside-hung motors. The standard wheel base is 5 ft. 1½ in.; the height from track to body bolster with weight of empty car is 22 inches. Brill solid forged side frames have very distinct advantages in this compactly constructed truck. Having no frame trussing enables the spring links to be placed at wide-apart points. Superior riding qualities are secured by the combination of plate and coil bolster springs which graduate the spring action for light and heavy loads. In other words, the bolster coil springs are automatically put in action under light loads. The arrangement is known as the Brill Graduated Spring System.

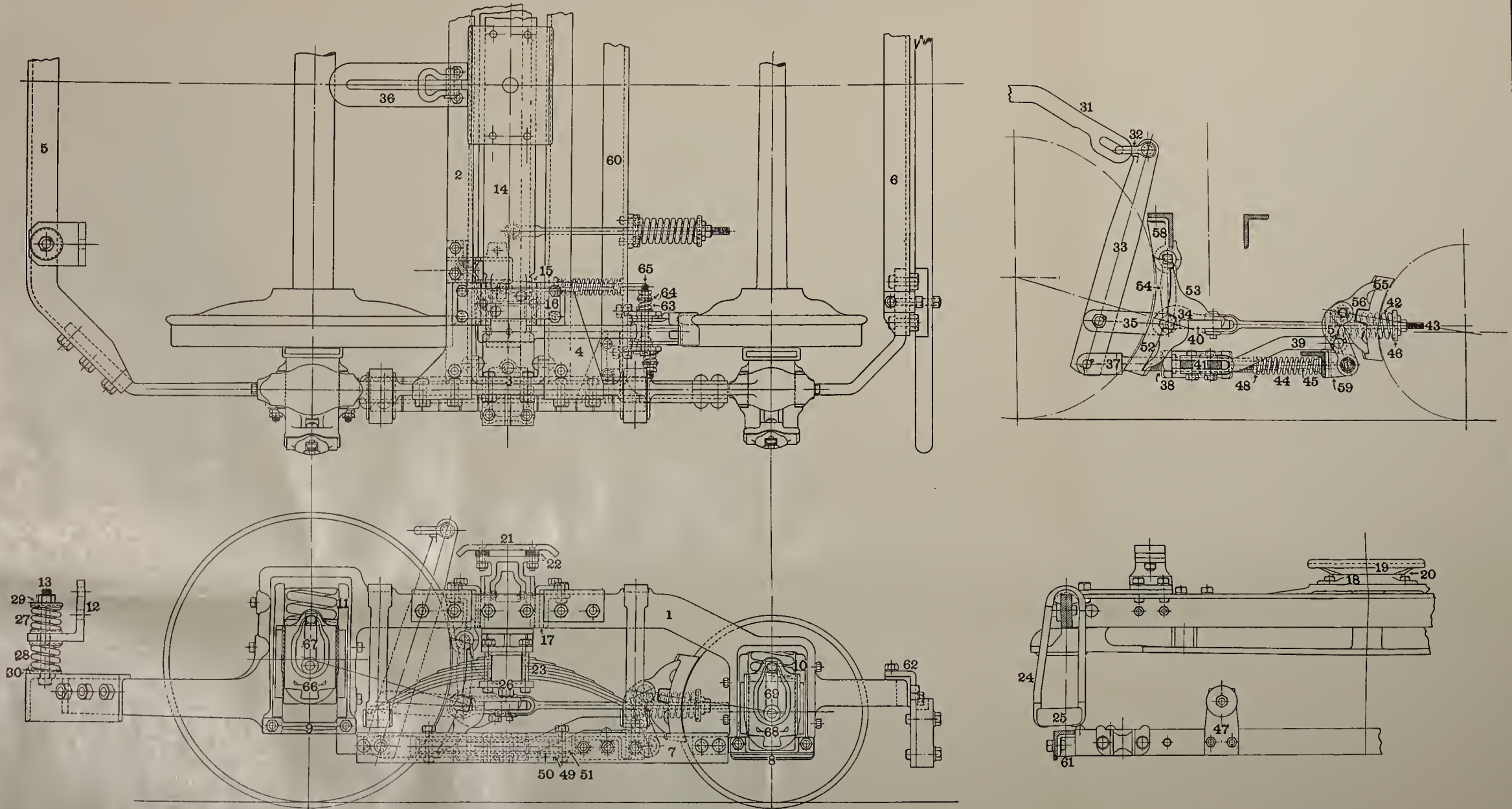
THE J. G. BRILL COMPANY, PHILADELPHIA





BRILL No. 39-E TRUCK

(PATENTED)

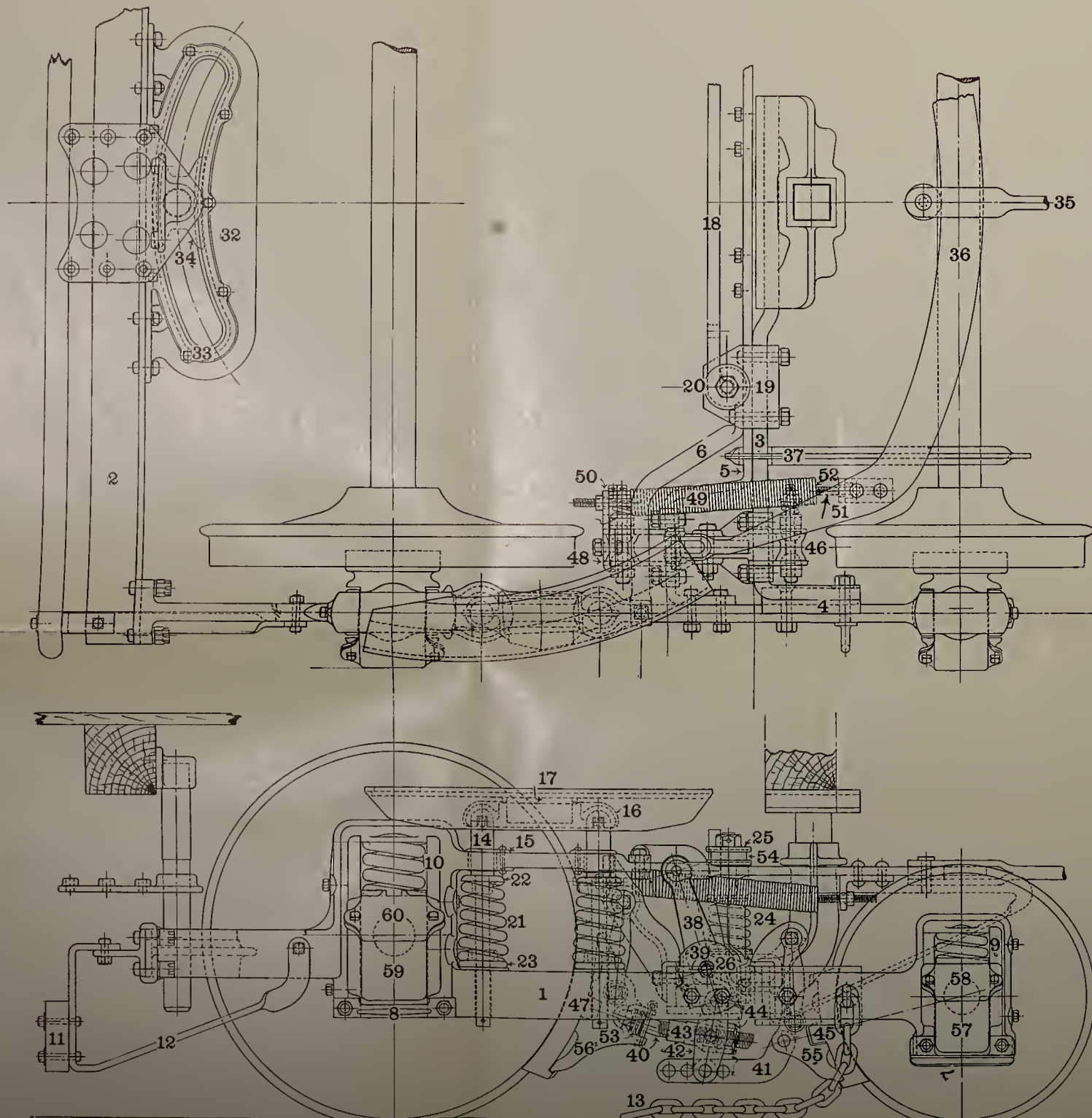


Names of Parts

- | | | | |
|---|--|--|---|
| 1 Side Frame | 18 Truck Bolster Pivot Plate | 34 Upright Lever Holder | 52 Driving Wheel Brake Shoe |
| 2 Transom | 19 Body Bolster Pivot Plate | 35 Upright Lever Fulcrum | 53 Driving Wheel Brake Shoe Holder |
| 3 Double Corner Bracket | 20 Truck Bolster Pivot Plate Ring | 36 Upright Lever Guide | 54 Driving Wheel Brake Half-Ball Hanger |
| 4 Transom Gusset Plate | 21 Side Bearing Rub Plate | 37 Bottom Brake Rod | 55 Trail Wheel Brake Shoe |
| 5 Motor End Crossing | 22 Side Bearing Adjusting Plate | 38 Bottom Brake Rod Adjusting Nut | 56 Trail Wheel Brake Shoe Holder |
| 6 Trail End Crossing | 23 Semi-Elliptic Spring | 39 Brake Connecting Rod | 57 Trail Wheel Brake Half-Ball Hanger |
| 7 Tie Bar | 24 Semi-Elliptic Spring Link | 40 Driving Wheel Brake Beam | 58 Driving Wheel Brake Shoe Hanger Holder |
| 8 Small Pedestal Tie Bar | 25 Semi-Elliptic Spring Rocker Seat | 41 Trail Wheel Brake Beam | 59 Trail Wheel Brake Shoe Hanger Holder |
| 9 Large Pedestal Tie Bar | 26 Semi-Elliptic Spring Seat | 42 Driving Wheel Brake Beam Release Spring | 60 Lever Support |
| 10 Small Pedestal Gib | 27 Motor Support Coil Spring, Upper | 43 Driving Wheel Brake Beam Release Spring Bolt | 61 Lever Support Bracket |
| 11 Large Pedestal Gib | 28 Motor Support Coil Spring, Lower | 44 Trail Wheel Brake Beam Release Spring | 62 Life Guard Bracket |
| 12 Motor Support | 29 Motor Support Coil Spring Cap (same for upper and lower springs) | 45 Trail Wheel Brake Beam Release Spring Bolt | 63 Brake Hanger Spring |
| 13 Motor Bolt | 30 Motor Support Coil Spring Seat (same for upper and lower springs) | 46 Driving Wheel Brake Beam Release Spring Caps | 64 Brake Hanger Spring Cap |
| 14 Bolster (cast in a single piece including side bearings) | | 47 Driving Wheel Brake Beam Release Spring Bracket | 65 Brake Hanger Spring Bolt |
| 15 Side Bearing Chafing Plate | | 48 Trail Wheel Brake Beam Release Spring Caps | 66 Driving Wheel Journal Box |
| 16 Transom Chafing Plate | | 49 Brake Beam Slide | 67 Driving Wheel Journal Box Lid |
| 17 Chafing Plate Filling Block | | 50 Brake Beam Slide Wear Plate | 68 Trail Wheel Journal Box |
| | | 51 Brake Beam Slide Filler | 69 Trail Wheel Journal Box Lid |

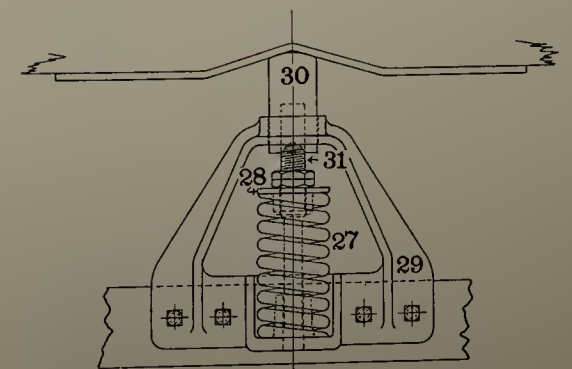
BRILL No. 22 TRUCK

(PATENTED)



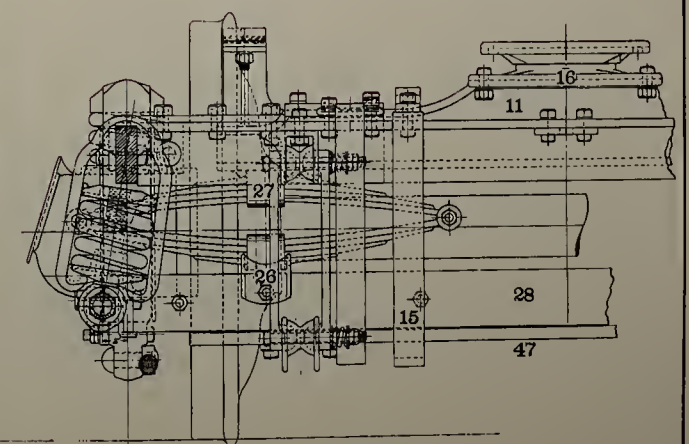
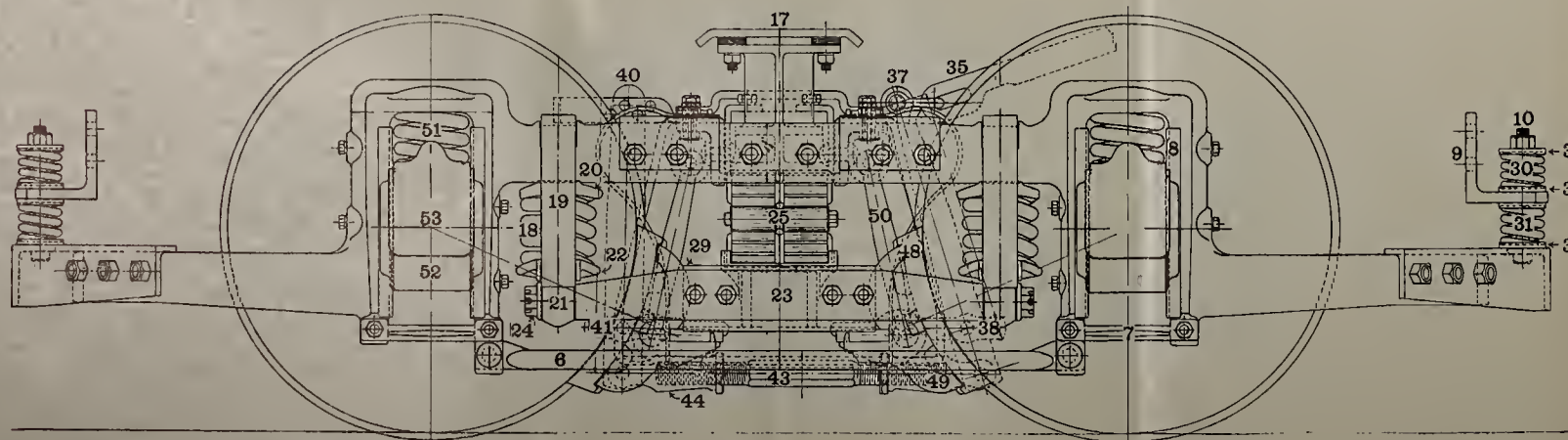
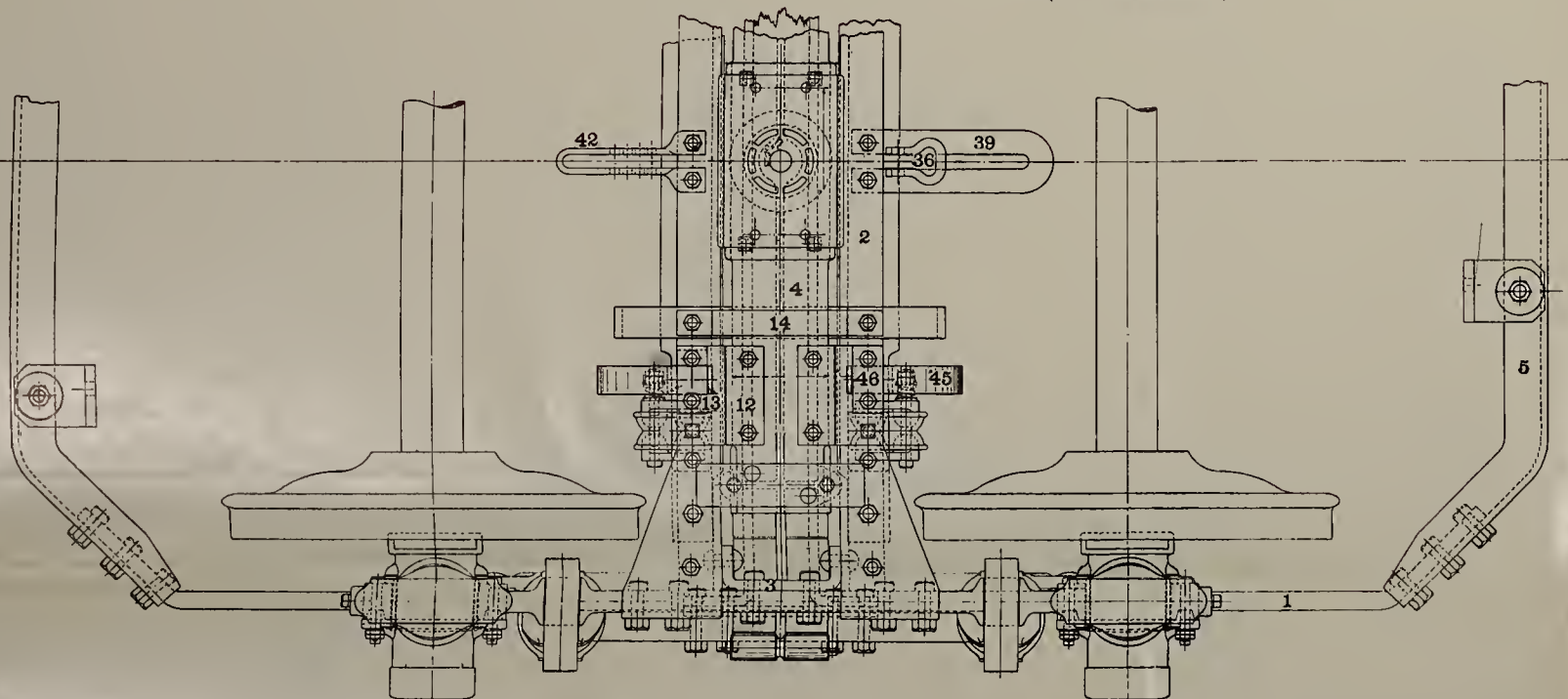
Names of Parts

- | | |
|--|--|
| 1 Side Frame | 31 Compression Spring Post |
| 2 End Frame | 32 Radial Casting |
| 3 Cross Bar | 33 Radial Casting Plate |
| 4 Cross Bar Carrier | 34 Radial Block |
| 5 Brake Hanger Carrier | 35 Brake Rod (Stub with Jaw and Roller) |
| 6 Spring Post Frame Extension Brace | 36 Radius Bar |
| 7 Pedestal Cap (Trail) | 37 Radius Bar Slide |
| 8 Pedestal Cap (Motor) | 38 Live Lever |
| 9 Pedestal Gib (Trail) | 39 Live Lever Fulcrum |
| 10 Pedestal Gib (Motor) | 40 Bottom Truck Connection (Driving Wheel) |
| 11 Wheelguard | 41 Bottom Truck Connection (Trail Wheel) |
| 12 Wheelguard Bracket | 42 Brake Link |
| 13 Safety Chain | 43 Bottom Truck Connection Nut |
| 14 Body Spring Post | 44 Bottom Truck Connection Jam Nut |
| 15 Body Spring Post Bushing | 45 Brake Shoe (Trail Wheel) |
| 16 Side Bearing | 46 Brake Hanger (Trail Wheel) |
| 17 Side Bearing Wear Plate | 47 Brake Shoe (Driving Wheel) |
| 18 Motor Suspension Bar | 48 Brake Hanger (Driving Wheel) |
| 19 Motor Suspension Spring Bracket | 49 Brake Release Spring |
| 20 Motor Suspension Bar Bolt | 50 Brake Release Spring Holder |
| 21 Body Spring | 51 Brake Release Spring Bolt |
| 22 Body Spring Cap | 52 Brake Release Spring Nut |
| 23 Body Spring Seat | 53 Brake Rod Spring |
| 24 Motor Suspension Spring (Lower) | 54 Motor Suspension Spring (Upper) |
| 25 Motor Suspension Spring Cap (same for upper and lower springs) | 55 Brake Head (Trail Wheel) |
| 26 Motor Suspension Spring Seat (same for upper and lower springs) | 56 Brake Head (Driving Wheel) |
| 27 Compression Spring | 57 Journal Box (Trail Wheel) |
| 28 Compression Spring Cap | 58 Journal Box Lid (Trail Wheel) |
| 29 Compression Spring Bracket | 59 Journal Box (Driving Wheel) |
| 30 Compression Block | 60 Journal Box Lid (Driving Wheel) |



BRILL No. 27-F TRUCK

(PATENTED)



Names of Parts

- 1 Side Frame
- 2 Transom
- 3 Transom Corner Bracket
- 4 Transom Gusset Plate
- 5 End Frame
- 6 Pedestal Tie Bar
- 7 Pedestal Cap
- 8 Pedestal Gib or Wear Plate
- 9 Motor Suspension Bar
- 10 Motor Suspension Bar Bolt
- 11 Bolster
- 12 Bolster Chafing Plate
- 13 Transom Chafing Plate
- 14 Transom Tie Bar

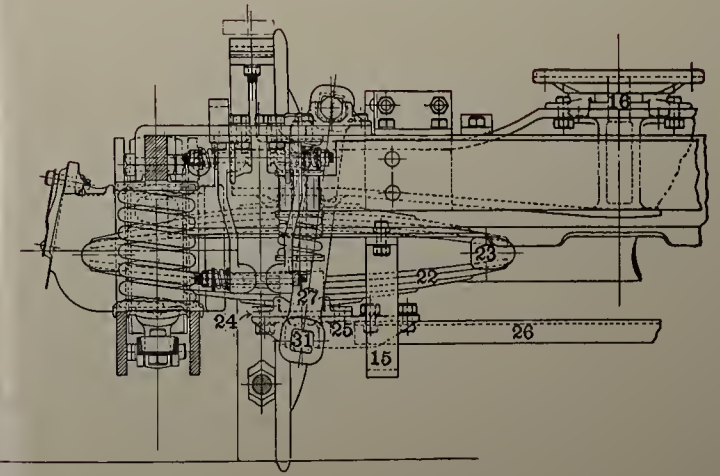
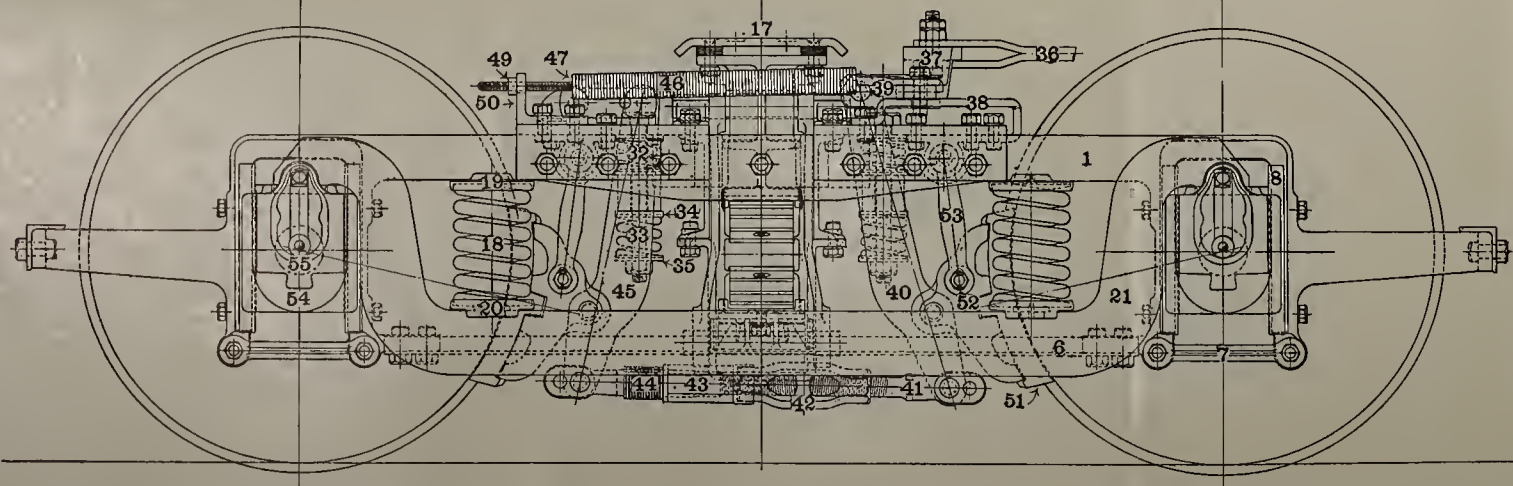
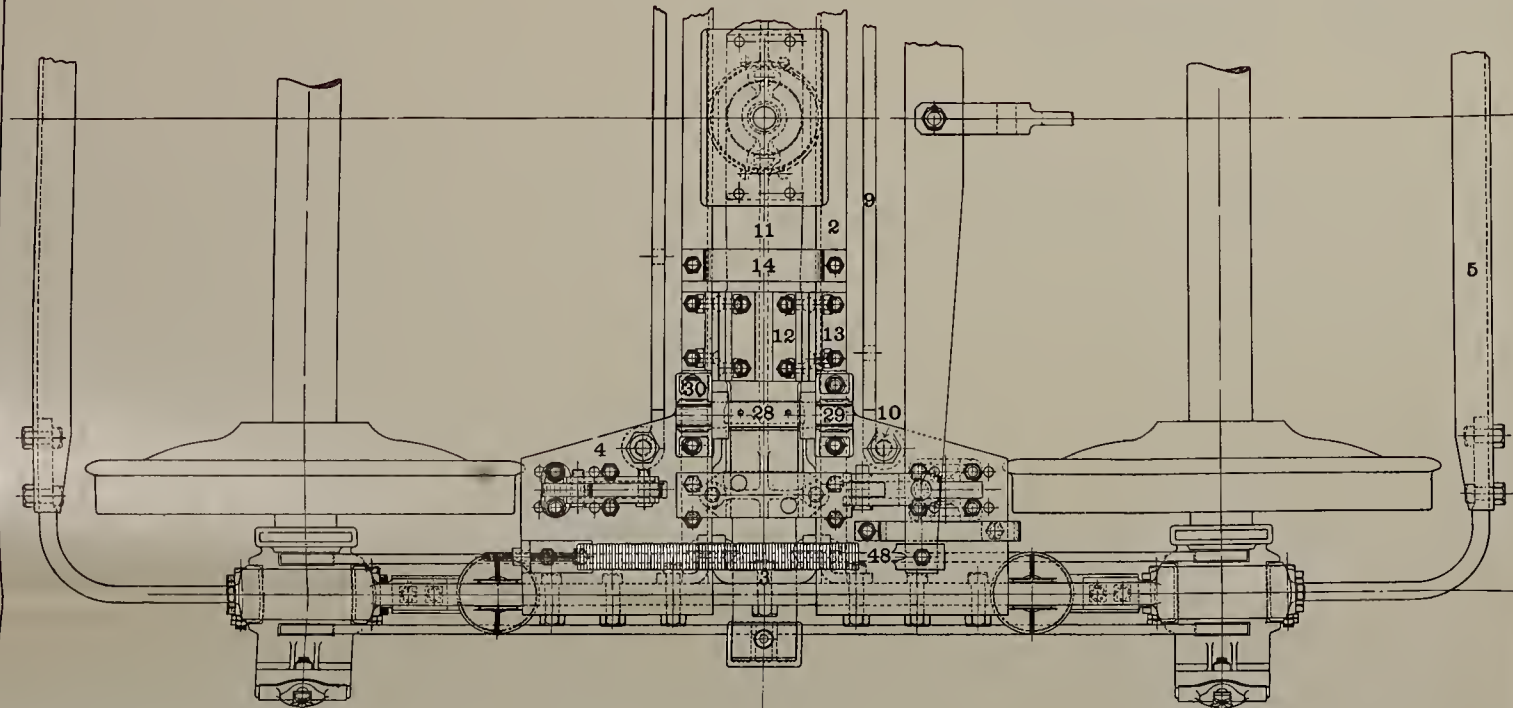
- 15 Brake Beam Safety Hanger
- 16 Truck Center Plate
- 17 Side Bearing Wear Plate
- 18 Equalizer Spring
- 19 Equalizer Spring Link
- 20 Equalizer Spring Cap
- 21 Equalizer Spring Eye-Bolt
- 22 Equalizer Spring Seat
- 23 Equalizer or Equalizing Bar
- 24 Equalizer Nut
- 25 Bolster Spring
- 26 Bolster Spring Seat
- 27 Bolster Spring Cap
- 28 Spring Plank

- 29 Spring Plank Carrier
- 30 Motor Suspension Spring (Top)
- 31 Motor Suspension Spring (Bottom)
- 32 Motor Suspension Spring Cap
- 33 Motor Suspension Spring Seat (Top)
- 34 Motor Suspension Spring Seat (Bottom)
- 35 Brake Rod
- 36 Brake Rod Clevis
- 37 Live Lever
- 38 Live Lever Fulcrum
- 39 Live Lever Guide
- 40 Dead Lever
- 41 Dead Lever Fulcrum
- 42 Dead Lever Guide

- 43 Bottom Truck Connection
- 44 Bottom Truck Connection Jaw
- 45 Brake Release Spring
- 46 Brake Release Spring Clip
- 47 Brake Beam
- 48 Brake Shoe
- 49 Brake Head
- 50 Brake Hanger
- 51 Journal Box Spring
- 52 Journal Box
- 53 Journal Box Lid

BRILL No. 27-M.C.B. TRUCK

(PATENTED)



Names of Parts

- 1 Side Frame
- 2 Transom
- 3 Transom Corner Bracket
- 4 Transom Gusset Plate
- 5 End Frame
- 6 Pedestal Tie Bar
- 7 Pedestal Cap
- 8 Pedestal Gib or Wear Plate
- 9 Motor Suspension Bar
- 10 Motor Suspension Bar Bolt
- 11 Bolster
- 12 Bolster Chafing Plate
- 13 Transom Chafing Plate
- 14 Transom Tie Bar

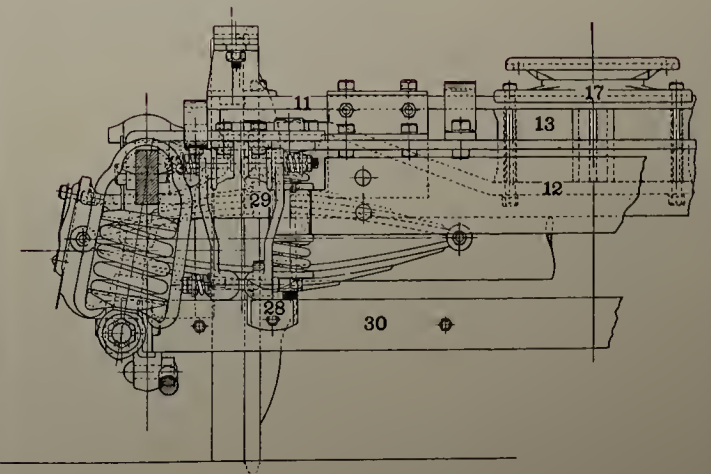
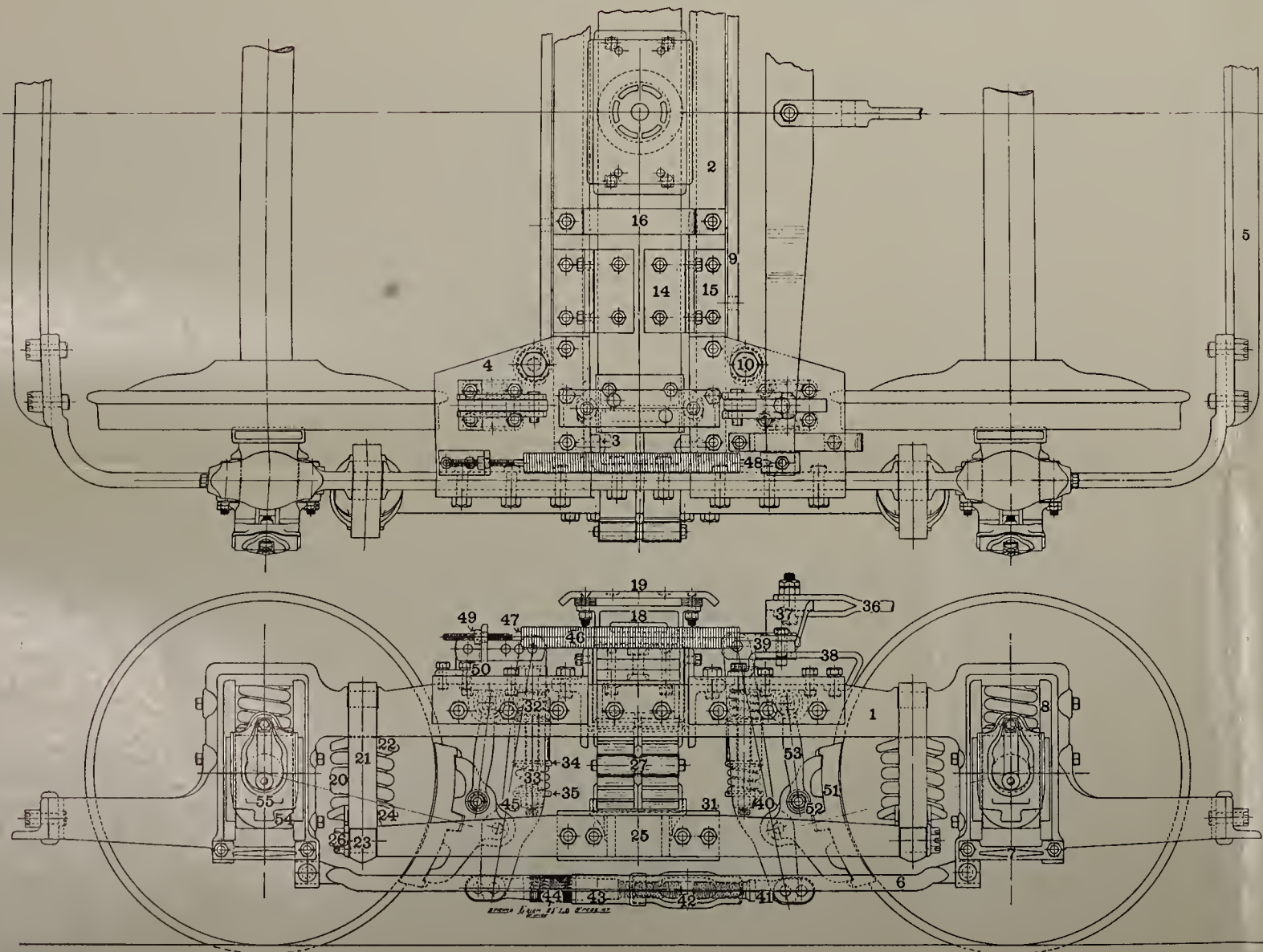
- 15 Spring Plank Safety Hanger
- 16 Truck Center Plate
- 17 Side Bearing Wear Plate
- 18 Equalizer Spring
- 19 Equalizer Spring Cap
- 20 Equalizer Spring Seat
- 21 Equalizer or Equalizing Bar
- 22 Bolster Spring
- 23 Bolster Spring Scroll
- 24 Bolster Spring Seat
- 25 Bolster Spring Seat Rocker
- 26 Spring Plank
- 27 Swing Link or Bolster Hanger
- 28 Swing Link Pin (Top)

- 29 Swing Link Pin Pivot
- 30 Swing Link Pin Bearing
- 31 Swing Link Pin (Bottom)
- 32 Motor Suspension Spring (Top)
- 33 Motor Suspension Spring (Bottom)
- 34 Motor Suspension Spring Cap
- 35 Motor Suspension Spring Seat
- 36 Brake Rod
- 37 Radius Bar
- 38 Radius Bar Guide
- 39 Radius Bar Clevis
- 40 Live Lever
- 41 Brake Turnbuckle End
- 42 Brake Turnbuckle

- 43 Brake Turnbuckle Lock
- 44 Brake Turnbuckle Lock Spring
- 45 Dead Lever
- 46 Brake Release Spring
- 47 Brake Release Spring Casting (location indicated)
- 48 Brake Release Spring Hook Bolt
- 49 Brake Release Spring Nut
- 50 Brake Release Spring Clip
- 51 Brake Shoe
- 52 Brake Head
- 53 Brake Hanger
- 54 Journal Box
- 55 Journal Box Lid

BRILL No. 27-E TRUCK

(PATENTED)



Names of Parts

- 1 Side Frame
- 2 Transom
- 3 Transom Corner Bracket
- 4 Transom Gusset Plate
- 5 End Frame
- 6 Pedestal Tie Bar
- 7 Pedestal Cap
- 8 Pedestal Gib or Wear Plate
- 9 Motor Suspension Bar
- 10 Motor Suspension Bar Bolt
- 11 Bolster Top Plate
- 12 Bolster Bottom Plate
- 13 Bolster Filling Casting
- 14 Bolster Chafing Plate

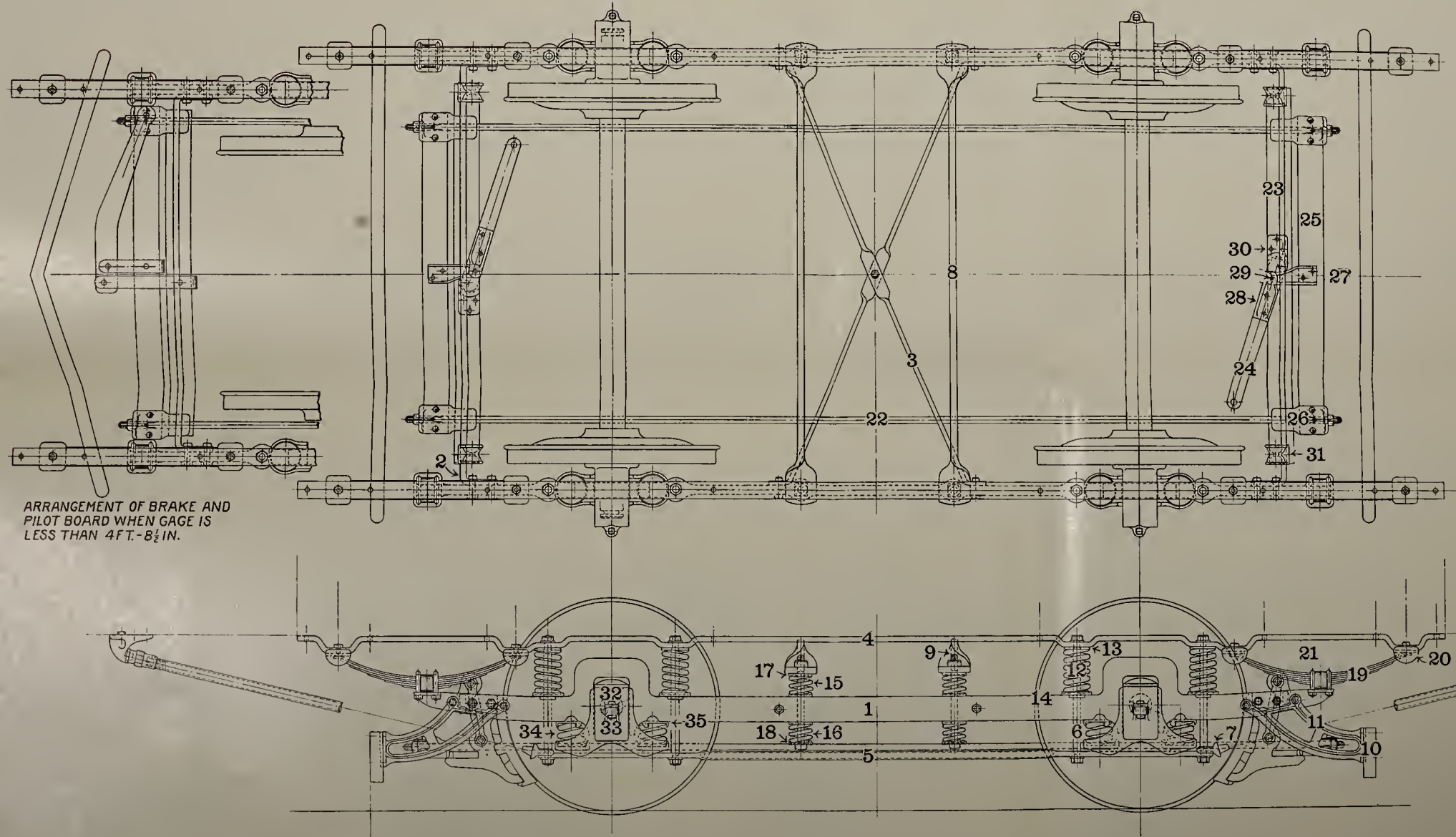
- 15 Transom Chafing Plate
- 16 Transom Tie Bar
- 17 Truck Center Plate
- 18 Side Bearing
- 19 Side Bearing Wear Plate
- 20 Equalizer Spring
- 21 Equalizer Spring Link
- 22 Equalizer Spring Cap
- 23 Equalizer Spring Eye-Bolt
- 24 Equalizer Spring Seat
- 25 Equalizer or Equalizer Bar
- 26 Equalizer Nut
- 27 Bolster Spring
- 28 Bolster Spring Seat

- 29 Bolster Spring Cap
- 30 Spring Plank
- 31 Spring Plank Carrier
- 32 Motor Suspension Spring (Top)
- 33 Motor Suspension Spring (Bottom)
- 34 Motor Suspension Spring Cap
- 35 Motor Suspension Spring Seat
- 36 Brake Rod
- 37 Radius Bar
- 38 Radius Bar Guide
- 39 Radius Bar Clevis
- 40 Live Lever
- 41 Brake Turnbuckle End
- 42 Brake Turnbuckle

- 43 Brake Turnbuckle Lock
- 44 Brake Turnbuckle Lock Spring
- 45 Dead Lever
- 46 Brake Release Spring
- 47 Brake Release Spring Casting (location indicated)
- 48 Brake Release Spring Hook Bolt
- 49 Brake Release Spring Nut
- 50 Brake Release Spring Clip
- 51 Brake Shoe
- 52 Brake Head
- 53 Brake Hanger
- 54 Journal Box
- 55 Journal Box Lid

BRILL SINGLE-TRUCK No. 21-E

(PATENTED)



Names of Parts

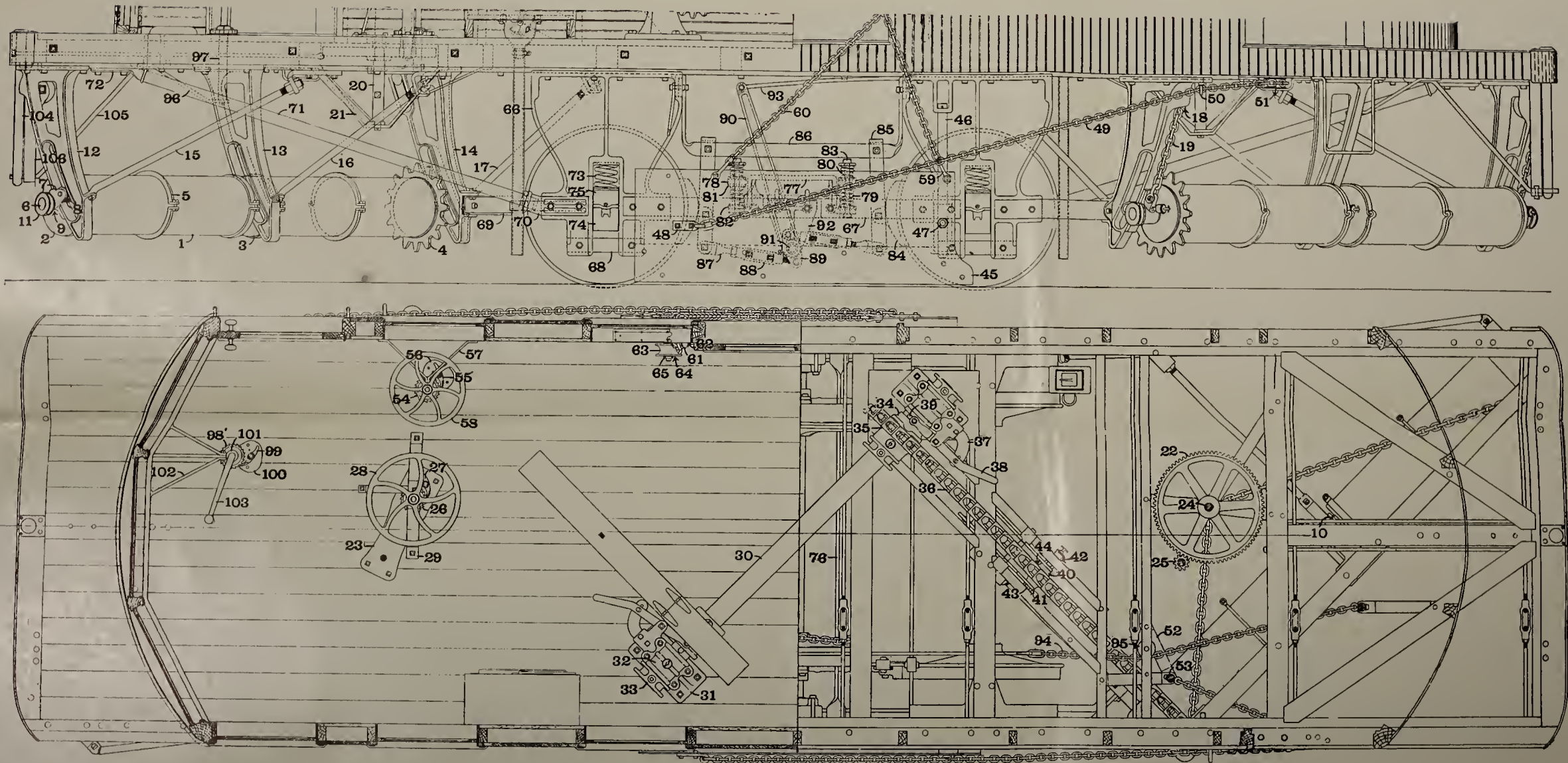
- 1 Side Frame
- 2 End Frame
- 3 Diagonal Brace
- 4 Top Chord
- 5 Spring Post Stay
- 6 Body Spring Post
- 7 Spring Post Stay Lug
- 8 Motor Suspension Bar
- 9 Motor Suspension Bar Bolt
- 10 Wheelguard

- 11 Wheelguard Bracket
- 12 Body Spring
- 13 Body Spring Cap
- 14 Body Spring Seat
- 15 Motor Suspension Spring (Top)
- 16 Motor Suspension Spring (Bottom)
- 17 Motor Suspension Spring Cap
- 18 Motor Suspension Spring Seat
- 19 Body End Spring
- 20 Body End Spring Cap

- 21 Body End Spring U-Bolt
- 22 Brake Rod
- 23 Brake Beam
- 24 Brake Lever
- 25 Equalizing Lever
- 26 Equalizing Lever Casting
- 27 Equalizing Lever Fulcrum
- 28 Brake Lever Casting
- 29 Brake Lever Stud
- 30 Brake Beam Fulcrum

- 31 Brake Hanger Carrier
- 32 Journal Box Lid
- 33 Journal Box
- 34 Journal Box Spring
- 35 Journal Box Spring Cap
- 36 Spring Post Stay Extension
- 37 Spring Post Stay Extension Adjusting Sleeve
- 38 Spring Post Stay Extension Adjusting Sleeve Bearing

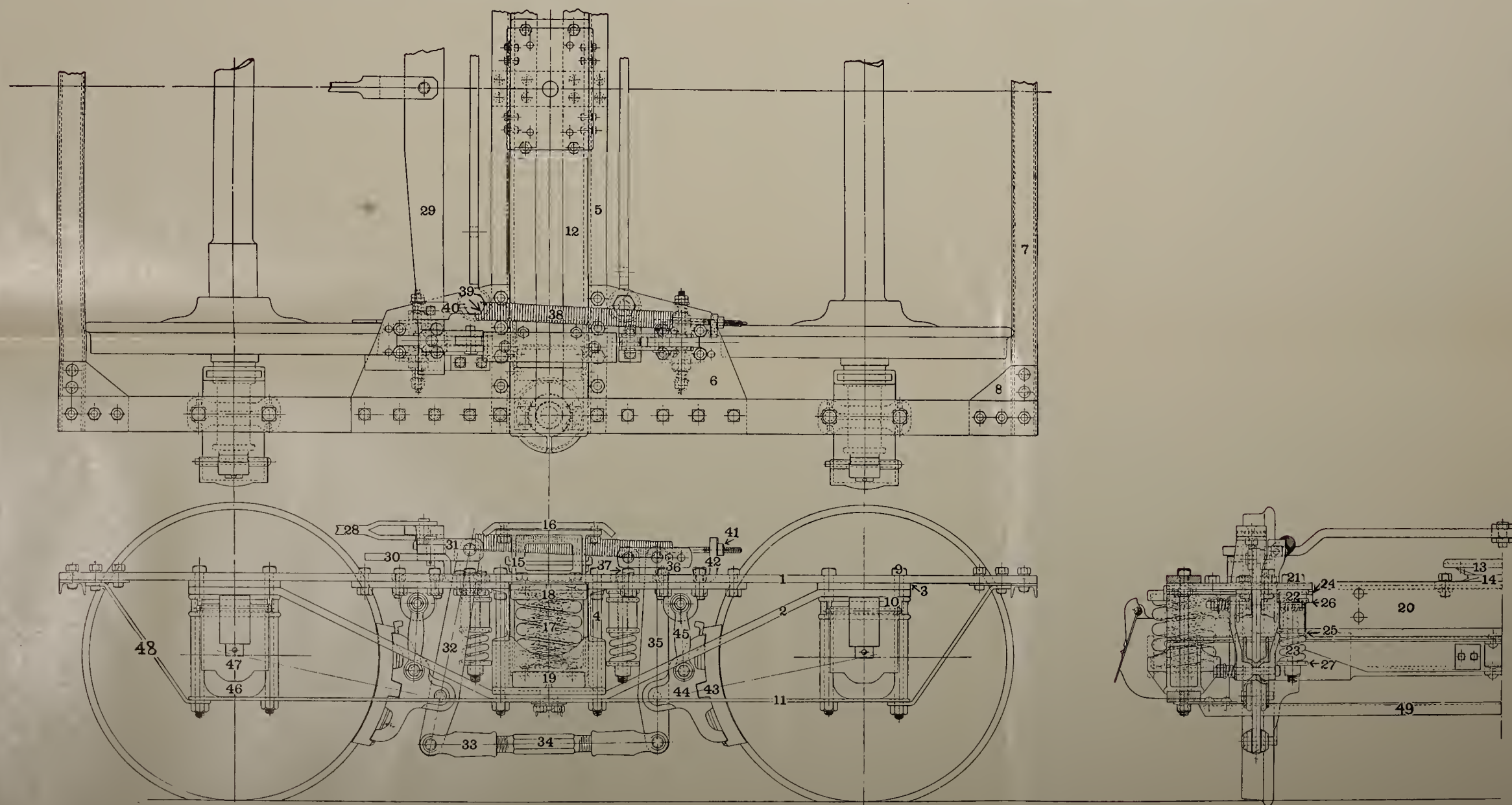
BRILL LONG-BROOM SWEEPER



Names of Parts

- | | | | | |
|---|--|--------------------------------------|------------------------------------|--|
| 1 Broom Drum (in four segments) | 21 Broom Lift Gear Shaft Brace | 43 Idler Sprocket Shaft | 64 Scraper Lift Quadrant Handle | 85 Brake Hanger |
| 2 Broom Drum Outside End Disc | 22 Broom Lift Gear | 44 Idler Spring (location indicated) | (location indicated) | 86 Brake Hanger Carrier |
| 3 Broom Drum Center Disc | 23 Broom Lift Gear Floor Plate | 45 Scraper | 65 Scraper Lift Quadrant Fulcrum | 87 Brake Turnbuckle End |
| 4 Broom Drum Sprocket and Disc | 24 Broom Lift Pinion Shaft | 46 Scraper Post | 66 Running Gear Pedestal | 88 Brake Turnbuckle |
| 5 Broom Drum Band | 25 Broom Lift Pinion | 47 Scraper Pivot | 67 Pedestal Stay | 89 Brake Rocker Arm |
| 6 Broom Drum Shaft | 26 Broom Pinion Shaft Ratchet | 48 Scraper Pull Chain Hook | 68 Pedestal Cap | 90 Brake Lever |
| 7 Broom Drum Shaft Journal | 27 Broom Pinion Shaft Ratchet Pawl | 49 Scraper Pull Chain | 69 Broom Inside Pedestal Stay | 91 Brake Rocker Shaft |
| 8 Broom Drum Shaft Journal Roller | 28 Broom Pinion Shaft Hand Wheel | 50 Scraper Pull Chain Guide | 70 Body End Truss Lug | 92 Brake Rocker Shaft Carrier |
| 9 Broom Drum Shaft Journal Cap | 29 Broom Pinion Shaft Brace (in two parts) | 51 Scraper Pull Chain Sheave | 71 Body End Truss | 93 Brake Rod |
| (location indicated) | 30 Broom Driving Shaft | 52 Scraper Pull Shaft Lower Brace | 72 Body End Truss Anchor | 94 Brake Chain |
| 10 Broom Drum Shaft Center Journal | 31 Broom Driving Shaft Bearing | 53 Scraper Pull Shaft | 73 Journal Box Spring | 95 Brake Chain Sheave |
| (location indicated) | 32 Broom Driving Shaft Bearing Cap | 54 Scraper Pull Shaft Ratchet | 74 Journal Box | 96 Brake Shaft Lower Brace |
| 11 Broom Drum Shaft Collar | 33 Broom Driving Shaft Collar | 55 Scraper Pull Shaft Ratchet Pawl | 75 Journal Box Lid | 97 Brake Shaft |
| 12 Broom Outside Pedestal | 34 Broom Driving Shaft Clutch | 56 Scraper Pull Shaft Floor Plate | 76 Motor Cross Bar | 98 Brake Shaft Ratchet |
| 13 Broom Center Pedestal | 35 Broom Driving Shaft Sprocket | 57 Scraper Pull Shaft Upper Brace | 77 Motor Suspension Spring Carrier | 99 Brake Shaft Ratchet Pawl |
| 14 Broom Inside Pedestal | 36 Broom Driving Chain | 58 Scraper Pull Shaft Hand Wheel | 78 Motor Suspension Bar | 100 Brake Shaft Floor Plate |
| 15 Broom Outside Pedestal Stay | 37 Clutch Lever Fulcrum | 59 Scraper Lift Chain Clevis | 79 Motor Suspension Spring, Lower | 101 Brake Shaft Sleeve |
| 16 Broom Center Pedestal Stay | 38 Clutch Lever | 60 Scraper Lift Chain | 80 Motor Suspension Spring, Upper | 102 Brake Shaft Upper Brace (in two parts) |
| 17 Broom Inside Pedestal Stay | 39 Clutch Key | 61 Scraper Lift Chain Sheave | 81 Motor Suspension Spring Cap | 103 Brake Handle |
| 18 Broom Lift Chain Sheave (location indicated) | 40 Idler Sprocket | 62 Scraper Lift Chain Wheel Carrier | 82 Motor Suspension Spring Seat | 104 Draw Bar Pull Pin |
| 19 Broom Lift Chain | 41 Idler Arm | (location indicated) | 83 Motor Suspension Spring Bolt | 105 Draw Bar Pull Pin Stay |
| 20 Broom Lift Gear Shaft | 42 Idler Carrier (location indicated) | 63 Scraper Lift Quadrant | 84 Brake Shoe | 106 Draw Bar Pull Pin Brace |

BRILL DIAMOND-FRAME MOTOR TRUCK No. 50-E



Names of Parts

- | | | | | |
|----------------------------|----------------------------|--|---|-----------------------------------|
| 1 Side Frame | 11 Tie Bar | 21 Motor Suspension Bar Bolt | 31 Radius Bar Clevis | 40 Brake Release Spring Hook Bolt |
| 2 Inverted Arch Bar | 12 Bolster | 22 Motor Suspension Spring (Top) | 32 Live Lever | 41 Brake Release Spring Nut |
| 3 Inverted Arch Bar Filler | 13 Body Center Plate | 23 Motor Suspension Spring (Bottom) | 33 Brake Turnbuckle End | 42 Brake Release Spring Clip |
| 4 Column Bolt | 14 Truck Center Plate | 24 Motor Suspension Spring Cap (Top) | 34 Brake Turnbuckle | 43 Brake Shoe |
| 5 Transom | 15 Side Bearing | 25 Motor Suspension Spring Cap (Bottom) | 35 Dead Lever | 44 Brake Head |
| 6 Transom Gusset Plate | 16 Side Bearing Wear Plate | 26 Motor Suspension Spring Seat (Top) | 36 Dead Lever Adjusting Bar | 45 Brake Hanger |
| 7 End Frame | 17 Bolster Spring | 27 Motor Suspension Spring Seat (Bottom) | 37 Dead Lever Adjusting Bar Support | 46 Journal Box |
| 8 End Frame Gusset Plate | 18 Bolster Spring Cap | 28 Brake Rod | 38 Brake Release Spring | 47 Journal Box Lid |
| 9 Journal Box Bolt | 19 Bolster Spring Seat | 29 Radius Bar | 39 Brake Release Spring Casting
(location indicated) | 48 Pedestal Brace |
| 10 Frame Seat | 20 Motor Suspension Bar | 30 Radius Bar Guide | | 49 Center Frame Crossing |

SMITHSONIAN INSTITUTION LIBRARIES



3 9088 01549 0840